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ABSTRACT

Forecasts for the current year that are made sometime during the current year are not true annual forecasts because they include already known information for the early part of the year. The current methodology that evaluates these "forecasts" does not take into account the known information. This paper presents a methodology for calculating an implicit forecast for the latter part of a year conditional on the known information. We then apply the procedure to Japanese forecasts for 1988-2003 and analyze some of the characteristics of those predictions.

Running title: Implicit forecasts

Keywords: Consensus, Implicit forecasts, Japanese forecasts

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Evaluating Current Year Forecasts Made During the Year: A Japanese Example

Many forecasts for the current year are made sometime during the current year. These are not true annual forecasts because they include already known information for the early part of the year. The current methodology that evaluates these "forecasts" does not take into account the known information and treats the statement as a true forecast. Assume that a "forecast" for the current year is made in the middle of the year, when estimates for the first half of the year are already available. Instead of treating the forecast for the year as one that has a six month horizon, one should calculate the implicit forecast for the second half of the year, conditional on the known information.

This paper presents a methodology for calculating this implicit forecast conditional on using the published forecast for the whole year and the actual data for the first half of the year. We then apply the procedure to Japanese forecasts made in the period 1988-2003 and analyze some of the characteristics of those predictions.

I. Methodology: Estimating the Implicit Forecast

The Japanese forecasts were all made in the early months of each calendar year, 1988-2003. They refer to the performance of the Japanese economy during the fiscal year ending on Mar 31 of that calendar year. At the time the forecasts were prepared, the GDP data for the first half of the fiscal year were available, and we estimate an implicit GDP forecast for the second half of the fiscal year. This implicit forecast is obtained from the GDP forecast for the whole fiscal year and the actual GDP numbers for the first half of that year.[1]

Let t be the current year and define real GDP for year t-1 as a summation of the four quarterly values of GDP for that year:[2]

$$\sum_{n=1}^{4} X_{n,t-1}^{A} = X_{1,t-1}^{A} + X_{2,t-1}^{A} + X_{3,t-1}^{A} + X_{4,t-1}^{A}, \tag{1}$$

where $X_{i,t-1}^{A}$ represents the actual GDP of the *i*th quarter in year t-1. The published forecast for year t is defined as (2):

$$\sum_{n=1}^{4} X_{n,t-1}^{A} \times \mathrm{r_t} = \sum_{n=1}^{4} X_{n,t}^{f}, \tag{2}$$

where r_t is the predicted growth rate for year t. The known value of real GDP for the first half of year t is (3):

$$\sum_{n=1}^{2} X_{n,t}^{A} = X_{1,t}^{A} + X_{2,t}^{A} \tag{3}$$

By subtracting (3) from (2), we obtain the implicit predicted level of GDP for the second half of year t (4):

$$\sum_{n=1}^{4} X_{n,t}^{f} - \sum_{n=1}^{2} X_{n,t}^{A} = X_{3,t}^{f,implicit} + X_{4,t}^{f,implicit} = \sum_{n=3}^{4} X_{n,t}^{f,implicit} \tag{4}$$

The implicit forecast growth rate for the second half of t is compared with the actual GDP that occurred in the second half of year t-1: equation (5).

$$\sum_{n=3}^{4} X_{n,t-1}^{A} = X_{3,t-1}^{A} + X_{4,t-1}^{A} \tag{5}$$

By dividing (4) by (5), we obtain the implicit year over year forecast of the growth rate, $r_{t,\ implicit,}$ for the second half of year t: (6)

$$\sum_{n=3}^{4} X_{n,t}^{f,implicit} \Big/ \sum_{n=3}^{4} X_{n,t-1}^{A} = \mathrm{r_{t,\ implicit}} \tag{6}$$

We obtain the actual growth rate for the second half of year t in the same way:

$$\sum_{n=3}^{4} X_{n,t}^{A} = X_{3,t}^{A} + X_{4,t}^{A} \qquad (7)$$

where $X_{i,t}^{A}$ is the actual GDP in the *i*th quarter of t. The actual year over year growth rate, for the second half of the year, is (8):

$$\sum_{n=3}^{4} X_{n,t}^{A} \;/\; \sum_{n=3}^{4} X_{n,t-1}^{A} = r_{t,\text{ actual}} \qquad (8)$$

The error of the implicit forecast for the second half of year t is: (9)

$$\varepsilon_t = r_{t,\text{ implicit}} - r_{t,\text{ actual}} \qquad (9)$$

II – Data Description: Japanese Forecasts

The forecasts were obtained from Prof. Ashiya and are similar to those that he examined. (Ashiya 2005, 2006, 2007).[3] Since 1987, Japanese GDP forecasts have been published by Toyo Keizai Inc in the January or February issues of "Monthly Statistics" (Tokei Geppo). The number of yearly observations varies from 39 to 69. These forecasts are for both the current fiscal year and the next fiscal year. Only the current year forecasts for the fiscal years 1987-2003 are relevant for this analysis of implicit forecasts.

III – Results

This section presents the results about the accuracy of the Japanese implicit forecasts. The magnitude of the errors, a benchmark comparison, and a rationality test are all presented. We also determine whether there is a consensus among the forecasters.

A. Forecast Errors, Benchmark Comparison, and Rationality

Table 1 shows the differences in the magnitude of the forecast errors between (a) the current year forecast made with a six month lead when the known information for the year is not taken into account and (b) the implicit six month prediction for the second half of the year. In the first instance, the mean absolute error is 26% of the mean absolute change, whereas it is 78% in the latter case. Similarly, Theil's U coefficient increases but is still less than 1, i.e. the implicit forecasts are better than naïve predictions. *However, the large differences in the results clearly indicate the necessity of accounting for known information when evaluating current year forecasts.*

Because the consensus forecasts were better than naïve predictions, we also tested whether they were biased. The necessary condition for the absence of bias is that the mean forecast error be zero. (Holden and Peel, 1990) This null was not rejected at the 5% significance level.[4]

B – Is There a Consensus Among Forecasters?

1. Determining Consensus

The previous analyses examined the characteristics of the mean forecasts for each year within the sample period. We now determine whether in each year there is a consensus among the forecasters about the rate of growth of real GDP. Frequently, it is assumed that the mean of a distribution of forecasts represent a consensus. This use of the mean as a measure of central location of the forecasts, however, was adopted without determining the precise meaning of "consensus." It was for this reason that Schnader and Stekler (SS, 1991) and Kolb and Stekler (1996) developed a statistical procedure for testing whether a consensus exists.

We will use the method of SS to test for the presence of a consensus. SS argue that a "consensus would exist if the forecasts were relatively close to and resembled each other." A bimodal distribution implies at least two distinct collective opinions, indicating that there is no consensus. Unimodality, on the other hand, is a necessary but not sufficient condition. This is because the distribution of forecasts should be symmetric and relatively peaked when there is a consensus. An example would be a normal distribution.

If a distribution is not normal, it might be either more skewed, or more peaked or flatter. If a distribution is symmetrical but more peaked, it is leptokurtic. This indicates that most of the forecasts are even more tightly clustered around the mean than they are for the normal distribution, also yielding a consensus.

In both the skewed and the symmetrical platykurtic cases, there is no consensus. This is because the platykurtic distribution is characterized by a flatter top and more abrupt tails than normal. If the distribution of forecasts is unimodal but skewed, there is no consensus because the longer tail of the distribution indicates an identifiable and significant minority opinion about the state of the economy.

The flowchart of this statistical procedure, adopted from SS, is shown in Fig. 1. A test for normality is followed by tests for skewness and then kurtosis if the original distribution is non-normal.

2. Results

We apply this procedure to the implicit forecasts for each of the 16 years, 1988-2003, to determine whether there was a consensus. Based on the Shapiro-Wilk test, normality was rejected in all cases except for the year 2003. All but five of the non-normal distributions were skewed. The exceptions were 1990, 1992, 1994, 1995, and 1998. The kurtosis test did not reject the existence of a consensus in four of those years. Thus a consensus among the Japanese forecasters existed in only five of the sixteen years in our sample. There was no consensus and the forecasts were divergent because the forecasters had substantially different views about the performance of the Japanese economy in the second half of each of the fiscal years.

This result differs from that of Ashiya (2007) who found that a consensus did not exist in a smaller percentage of annual GDP forecasts. Two factors may explain this difference in the results. First, the two samples were not identical and Ashiya examined the annual forecasts while this paper evaluated the implicit half year predictions.

III. Conclusions

This paper has developed an approach for evaluating a forecast for the current year that is made during the year. We illustrated that method by calculating the implicit forecast for the second half of a fiscal year conditional on (1) the forecast for the whole year and (2) the information that was available at the time the prediction was made. We applied this method to Japanese forecasts and found that the errors of the implicit forecast value for second half of the year were quite large compared to those for the current-year forecast. We have also found that the Japanese forecasts did not represent a consensus in most years, primarily due to their divergent outlooks for the second half year.

These results confirm our hypothesis that evaluations of the current-year forecast, as though it were one that had a six month horizon, may not provide accurate information on forecasters' true ability because the information about the first half year is already known. The implicit forecast therefore enables us to evaluate forecaster accuracy by eliminating known information that has been incorporated into the estimate. We hope that this new technique of evaluating forecasts will improve macroeconomic forecasting performance.

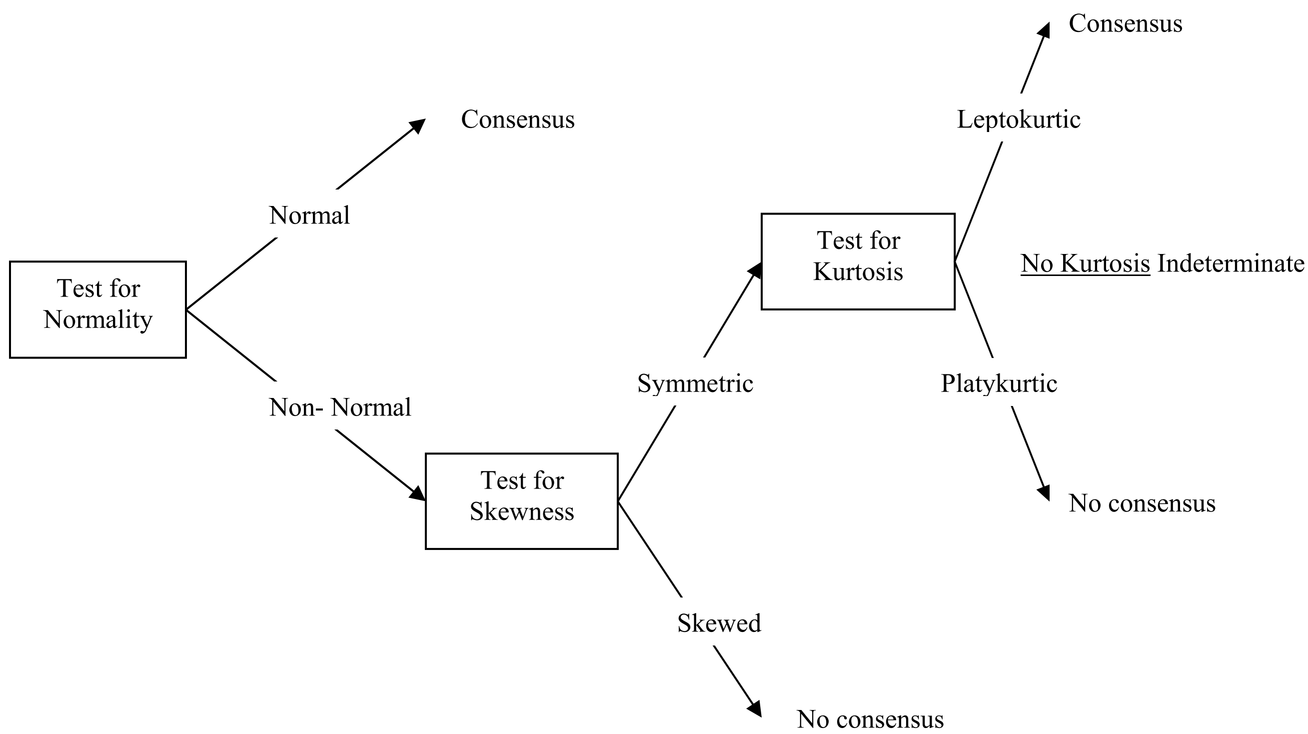

Fig. 1. Is there a consensus?

Table 1
Errors of Yearly and Implicit Half Year Forecasts

	Yearly	Implicit Half Year
Mean Absolute Error	0.59	1.92
Mean Absolute Change	2.26	2.45
Theil U Coefficient	0.28	0.58

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FOOTNOTES

[1] A fiscal year t is the period from April of year t to March of year t+1.

[2] The Japanese data that are used here are not seasonally adjusted, are the actual levels of GDP in each quarter, and are not in annual rate.

[3] We would like to thank Professor Ashiya for providing the database used in this analysis.

[4] The test statistic was 1.6769 with a p-value of 0.11