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The Directional Accuracy of 15-Months-Ahead Forecasts Made by the IMF

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A considerable number of studies have investigated the directional accuracy of macroeconomic forecasts, and have obtained mixed results for long-term forecasts. We reexamine this issue using the IMF forecasts for the G7 countries, and find that combining the long-term and the short-term forecasts significantly improves the directional accuracy.

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1. Introduction

Past literature has demonstrated that macroeconomic forecasts are subject to behavioral biases and that their forecast errors are substantial. [1] Critics point out, however, that these forecasts may provide useful information about the qualitative status of the economy, such as the acceleration/deceleration of economic activities. A considerable number of studies, in response, have investigated the directional accuracy of macroeconomic forecasts, and have obtained mixed results for long-term forecasts with one-year or longer horizon. While Lai (1990), Leitch and Tanner (1995), Artis (1996), Ash, Smyth, and Heravi (1998), Öller and Barot (2000), Pons (2001), and Greer (forthcoming) find negative evidence, Pons (2000) finds positive one. [2, 3]

These studies, however, do not fully utilize the information forecasters provide. They examine long-term forecasts in isolation, although typical forecaster releases both a long-term forecast for the next year and a short-term one for the ongoing year at the same time. Ashiya (2002a) addresses this issue using the Japanese GDP forecast data of 53 institutions, and finds that the *difference* between these two forecasts contains useful information on the acceleration/deceleration of the growth rate. The present paper follows his methodology, and shows that combining the long-term and the short-term forecasts significantly improves the directional accuracy of the IMF forecasts.

The paper is organized as follows. Section 2 explains the methodology. Section 3 explains data, and Section 4 reports the results. Section 5 concludes.

2. Methodology

This paper follows the methodology of Ashiya (2002a), and examines the extent the forecasts predict the direction of change correctly. Forecasts have positive value if they predict the acceleration/deceleration better than the random forecasts.

Suppose a forecaster in year t releases two forecasts, a short-term growth forecast for year t, $f_{t,t}$, and a long-term forecast for year $t+1$, $f_{t,t+1}$. Let g_t be the actual growth rate in year t, and let $\varepsilon_{t,t}$ ($\varepsilon_{t,t+1}$) be the forecast error of $f_{t,t}$ ($f_{t,t+1}$). Then, by definition, $f_{t,t} = g_t + \varepsilon_{t,t}$ and $f_{t,t+1} = g_{t+1} + \varepsilon_{t,t+1}$.

Let us define $\Delta fg_{t+1} \equiv f_{t,t+1} - g_t$, $\Delta ff_{t+1} \equiv f_{t,t+1} - f_{t,t}$, and $\Delta g_{t+1} \equiv g_{t+1} - g_t$.

Δfg_{t+1} (Δff_{t+1}) is positive if and only if the forecaster in year t predicts that the growth rate will accelerate in year $t+1$. Δg_{t+1} is positive if and only if the actual growth rate accelerated in year $t+1$. Previous studies of the directional analysis compare the sign of Δfg_{t+1} (i.e. $\operatorname{sgn}\Delta fg_{t+1}$) with the sign of Δg_{t+1} (i.e. $\operatorname{sgn}\Delta g_{t+1}$) to evaluate the usefulness of the long-term forecasts. Ashiya (2002a) points out, however, that $\operatorname{sgn}\Delta ff_{t+1}$ may be more accurate predictor of $\operatorname{sgn}\Delta g_{t+1}$ than $\operatorname{sgn}\Delta fg_{t+1}$ if $\varepsilon_{t,t}$ and $\varepsilon_{t,t+1}$ are highly correlated. Therefore this paper analyzes both $\operatorname{sgn}\Delta fg_{t+1}$ and $\operatorname{sgn}\Delta ff_{t+1}$.

To test the forecasting ability in the direction of change, we can use the Fisher's (1922) exact test based on contingency tables (See Henriksson and Merton (1981)). Consider the case of $\operatorname{sgn}\Delta fg_{t+1}$ for example. The null hypothesis is that $\operatorname{sgn}\Delta fg_{t+1}$ and $\operatorname{sgn}\Delta g_{t+1}$ are independent. Let n_{00} be the number of forecasts in which $\Delta fg_{t+1} > 0$ and $\Delta g_{t+1} > 0$, n_{01} be the number of forecasts in which $\Delta fg_{t+1} \le 0$ and $\Delta g_{t+1} > 0$, n_{10} be the number of forecasts in which $\Delta fg_{t+1} > 0$ and $\Delta g_{t+1} \le 0$, n_{11} be the number of forecasts in which $\Delta fg_{t+1} \le 0$ and $\Delta g_{t+1} \le 0$, and $n \equiv n_{00} + n_{01} + n_{10} + n_{11}$ be the total number of forecasts. Then the probability that this outcome came form a population that satisfies the null hypothesis is

$$\sum_{x=n_{11}}^{n^*} \binom{n_{10}+n_{11}}{x}\binom{n_{00}+n_{01}}{n_{01}+n_{11}-x} \bigg/ \binom{n}{n_{01}+n_{11}}$$

$$\text{where} \quad n^* \equiv \min\{n_{10}+n_{11}, n_{01}+n_{11}\}.$$

We can test the null hypothesis that $\operatorname{sgn}\Delta ff_{t+1}$ and $\operatorname{sgn}\Delta g_{t+1}$ are independent by the same method.

3. Data

The International Monetary Fund (IMF) has published the GDP forecasts for the G7 countries in the October issue of "World Economic Outlook" since 1984. [4] The issue in year t contains the three-months-ahead forecast for year t ($f_{t,t}$) and the 15-months-ahead forecast for year $t+1$ ($f_{t,t+1}$). We consider the accuracy of the

15-months-ahead forecasts for 1985-2001. As for the actual growth rate g_t, Keane and Runkle (1990) argue that the revised data introduces a systematic bias because the extent of revision is unpredictable for the forecasters. For this reason we use the initial announcement of the growth rate published in the April/May issue of “World Economic Outlook”.

4. Results

First we check the proportion of correct forecasts. Define $P(\Delta fg_{t+1})$ ($P(\Delta ff_{t+1})$) as the proportion of times that the forecast correctly predicts $\operatorname{sgn}\Delta g_{t+1}$ by $\operatorname{sgn}\Delta fg_{t+1}$ ($\operatorname{sgn}\Delta ff_{t+1}$). The first and the third columns of Table 1 show $P(\Delta fg_{t+1})$ and $P(\Delta ff_{t+1})$ for the individual countries. These columns show that Δff_{t+1} is more accurate than Δfg_{t+1} except for Germany. The average of $P(\Delta fg_{t+1})$ is 0.639, and the average of $P(\Delta ff_{t+1})$ is 0.714. [5]

The second and the fourth columns of Table 1 show the results of the non-parametric analysis for the individual countries. The second column confirms the result of Artis (1996): the null hypothesis that $\operatorname{sgn}\Delta fg_{t+1}$ and $\operatorname{sgn}\Delta g_{t+1}$ are independent is *not* rejected for any country (at the 0.10 significance). It follows that the long-term forecasts alone have no power in predicting $\operatorname{sgn}\Delta g_{t+1}$. In contrast, the fourth column shows that the null hypothesis that $\operatorname{sgn}\Delta ff_{t+1}$ and $\operatorname{sgn}\Delta g_{t+1}$ are independent is rejected for Canada, France, Japan, and U.K. (at the 0.05 significance). The predictive power of the long-term forecasts significantly improves when combined with the short-term forecasts.

These results, which are consistent with Ashiya (2002a), indicate that there is a positive correlation between $\varepsilon_{t,t}$ and $\varepsilon_{t,t+1}$. There might be a common disturbance term in $\varepsilon_{t,t}$ and $\varepsilon_{t,t+1}$ such as optimism/pessimism, or the forecaster might gradually learn about a shift in the process of fundamentals as Lewis (1989) suggests.

5. Conclusions

This paper has evaluated the directional accuracy of the long-term GDP forecasts using the IMF forecasts for the G7 countries. The IMF releases both a 15-months-ahead forecast for the next year and a three-months-ahead forecast for the ongoing year at the same time. It is found that the sign of the difference between these two forecasts is useful to predict the acceleration/deceleration of the growth rate of the next year, although the 15-months-ahead forecast alone is not. This result is contrary to the argument of past literature that forecasts with one year or longer horizon are no better than a coin flip in predicting the direction of change.

Notes

1. See Kolb and Stekler (1990), McNees (1992), Zarnowitz and Braun (1993), Pons (1999), Artis (1996), Ghosh and Dutt (2000), Pons (2000), and Ashiya (forthcoming, 2002b) for example.
2. Artis (1996) and Pons (2000) both evaluate the GDP forecasts made by the IMF, but they employ different vintages of realization data. Artis chooses the data published in October of year $t+1$ as the actual growth rate of year *t*, whereas Pons chooses the latest available data.
3. See Schnader and Stekler (1990), Stekler (1994), Ash et al. (1998), and Joutz and Stekler (2000) for the directional analysis of short-term forecasts.
4. Artis (1996) contains the data of $f_{t,t+1}$ since 1973, but does not contain the data of $f_{t,t}$.
5. The average directional accuracy of the three-months-ahead forecasts is remarkably high: the minimum is 0.833 (Italy and U.S.A.) and the maximum is 1.000 (Canada and U.K.). The null hypothesis that $\operatorname{sgn}\Delta fg_t$ and $\operatorname{sgn}\Delta g_t$ are independent is rejected at the 0.01 significance for all seven countries.

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Table 1. The directional accuracy of Δfg_{t+1} and Δff_{t+1}

	Δfg_{t+1}		Δff_{t+1}	
	$P(\Delta fg_{t+1})$	P-value [a]	$P(\Delta ff_{t+1})$	P-value [a]
Canada	0.706	0.117	0.765	0.043*
France	0.647	0.160	0.824	0.006**
Germany	0.588	0.373	0.529	0.581
Italy	0.588	0.261	0.647	0.247
Japan	0.706	0.109	0.765	0.036*
U.K.	0.706	0.117	0.882	0.004**
U.S.A.	0.529	0.395	0.588	0.261
Avg.	0.639		0.714	

Notes

a: The null hypothesis is that there is no correlation between $\operatorname{sgn}\Delta fg_{t+1}$ ($\operatorname{sgn}\Delta ff_{t+1}$) and $\operatorname{sgn}\Delta g_{t+1}$.

*: Significant at the 0.05 level.

**: Significant at the 0.01 level.