

December 21, 2006

Flattening of the Yield Curve May Be in the Offing

Makoto Takaoka
Economist

When the Bank of Japan raises the uncollateralized overnight call rate, and if the market expects a deceleration of the economy, the increase in government bond yields is small, resulting in the diminution of the spread between long- and short-term interest rates. This is because the spread between long- and short-term interest rates increases or decreases in anticipation of economic conditions and the inflation rate. Hence, the Cabinet Office uses this spread as one of the leading indicators in its diffusion index.

This study has made an estimation of a model, which examines the yield curve (which contains more information than the spread between long- and short-term interest rates) in order to forecast economic conditions and the inflation rate. Based on these forecasts, the study goes on to forecast the future movement of interest rates.

The Call Rate Has Only Indirect Impact

Some preparatory work is necessary to build a model. With respect to the yield curve, groups of interest rates corresponding to various periods, ranging from three months to 10 years, are expressed in the three interest-rate components of short-term, medium-term and long-term. In recent years, since more studies of the yield curve have been made in the field of finance (theories of finance) than in the field of macro economics, this study is based on the fruits of studies in the former.

In this study, economic conditions are represented by the growth rate of the real gross domestic product (GDP), while the rate of increase from the previous year of the consumer price index (CPI) represents the inflation rate. Since interest rate data are monthly, quarterly data of the GDP are statistically broken down into monthly data and the rates of their changes from the previous year are used.

In addition to interest rate groups, comprising interest rates for three months and those for longer periods, the call rate, which is a monetary policy tool of the Bank of Japan, is included as an exogenous variable which has impact on the model as a whole.

Using these indicators, this study has conducted a “maximum likelihood estimation” to estimate the model, which expresses the data from January 1992 to June 2006 in a “state-space model.” The following are the results of the estimation (Tables 1 and 2).

Table 1 Mutual Relationship Between Yields and Macro Variables

		Previous period (t-1)				
		Short-term	Medium-term	Long-term	Growth rate	Inflation rate
Current period (t)	Short-term	0.90	0.00	0.00	0.00	0.06
	Medium-term	0.09	0.97	0.00	0.01	0.29
	Long-term	0.07	0.00	0.98	0.00	-0.14
	Growth rate	-0.03	0.01	0.02	0.96	0.00
	Inflation rate	0.01	0.00	0.00	0.01	0.96

Note: Estimated values of the coefficient series of state variables. For example, the first line signifies that $\text{short-term rate}(t) = 0.90 * \text{short-term rate}(t-1) + 0.06 * \text{inflation rate}(t-1) + \dots$
 Bold letters denote significant at the 5-percent level.

Table 2 Impact of the Call Rate

Short-term	Medium-term	Long-term	Growth rate
0.03	-0.23	0.04	-0.01

Note: Impact of the current period's call rate on the state variables of the next period.

First, when the long-term component of interest rates rises, the growth rate in the following term tends to increase. In other words, there is a “positive” relationship between the two. While economics teaches that an increase in long-term interest rates has a “negative” impact on investment in plants and equipment, and housing, here we are not discussing such a cause-and-effect relationship. Rather, this study points out that long-term interest rates increase or decrease “in anticipation” of changes in the economic growth rate.

Second, when the inflation rate increases, the short-term and medium-term components tend to rise in the following term. Interest rates which react to the release of price statistics are limited to those within this scope.

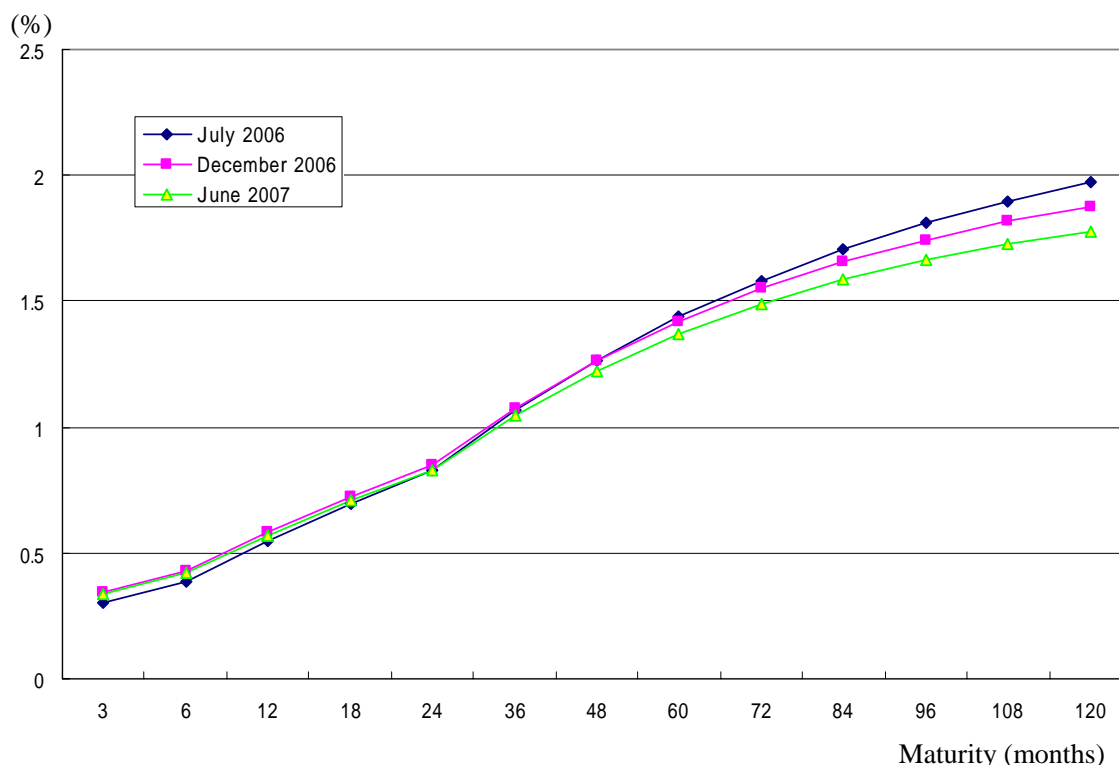
Third, the call rate, which is a policy variable, does not have “direct” impact on the economic growth rate in the following term. While the call rate has a “positive” relationship with the short-term component of interest rates in the following term, it has a “negative” relationship with the medium-term component. That is to say, an increase in the call rate influences the movement of the real economy via the following route: An increase in short-term interest rates leads to falls in medium- and long-term interest rates, which in turn lead to a decline in the economic growth rate.

Fourth, there is no observable trend that long-term interest rates act as leading indicators in the short term. It can be said that long-term interest rates rise or fall by discounting for the business conditions or inflation rate that would result from policy changes, rather than in anticipation of future policy interest rate per se. However, this finding may have been influenced by the fact that our estimation used data obtained under the zero-interest rate policy, under which short-term interest rates change little. Therefore, further studies will be necessary.

Deceleration of Growth and a Fall in Long-term Interest Rates Anticipated

A number of forecasts has been made based on the estimation results of this study. Chart 1 shows the results of a forecast of yields between July 2006 and June 2007 based on a model, which was estimated from the data for the period between January 1992 and June 2006. The assumption for this forecast is that the call rate will be fixed at 0.25 percent during the period of the forecast. In this forecast, long-term interest rates fall gradually, resulting in the flattening of the yield curve. During this period, the rate of economic growth will decline mildly from 2 percent to approximately 1.8 percent, while the inflation rate will fall from 0.6 percent to around 0.4-0.5 percent. This forecast of the inflation rate, however, is based on the CPI, which in turn is based on 2000 standards. The actual decline in the inflation rate since July 2006 has been larger than the forecast because of the impact of the recent revision of CPI standards.

Chart 1 Forecast of the Yield Curves



After the termination of the zero-interest rate policy in July 2006, actual long-term interest rates were on a downward trend through September. Our forecast, which was made from a model based on data through June 2006, also captured this downward trend. Even if interest rates had not been raised in July, the overall trend of the forecast would not have changed significantly, although the extent of the flattening of the yield curve would have been somewhat smaller. In order to maintain the rate of economic growth that was taking place then, the call rate would have had to be negative, and if it had been so, long-term interest rates would have continued to rise.

In recent years, the movements of long-term interest rates in Japan have become increasingly linked to those of overseas interest rates, including the yields of U.S. government bonds. Therefore, incorporating the effect of overseas interest rates on Japanese long-term interest rates is a theme for future studies.

References

Diebold, F.X., G.D. Rudebusch and S.B. Aruoba, (2006) "The macroeconomy and the yield curve: a dynamic latent factor approach," *Journal of Econometrics*.

Makoto Takaoka

*Economist, Research Service Department, Japan Center for Economic Research.
His fields of study are time-series analyses of the economy, seasonal adjustment
methodology, etc.*

(Contact : 81-3-3639-2819)

Copying of this report is prohibited. Please contact JCER for further details.

Copyright © 2006 JCER

Japan Center for Economic Research (JCER)

Nikkei Kayabacho Bldg. 2-6-1 Nihombashi Kayabacho, Chuo-ku, Tokyo 103-0025, Japan
Phone:81-3-3639-2810 / FAX:81-3-3639-2839 / E-mail:jcernet@jcer.or.jp