RECENT BEHAVIOR OF THE $M_1$ - ADJUSTED MONETARY BASE MULTIPLIER AND FORECASTS FOR EARLY 1984

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and

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Since the last meeting of this committee, we have been experimenting with a different presentation of our forecasts of the $M_1$ - Adjusted Monetary Base Multiplier. In the past we have always constructed forecasts directly from the forecasts of the various component ratios, which come out of the ARIMA models that we have estimated. These forecasts are not seasonally adjusted, so comparisons over time horizons shorter than one year are difficult to interpret. Our revised presentation allows us to compute forecasts on a seasonally adjusted basis that are not contaminated by errors in forecasting seasonal factors. The presentations employ the known seasonal factors that are published in the Federal Reserve Bulletin for the various components of the monetary aggregates and the seasonal factors constructed each year for the Adjusted Monetary Base by the Federal Reserve Bank of St. Louis. The exact formulas that are employed to construct a seasonally adjusted forecast of the multiplier from the not seasonally adjusted forecasts of the component ratios are indicated in the note attached to this report.

The history of our recent forecasting experiments is presented in table 1. There, monthly forecasts on up to six months horizons are given starting with data available through August 1983, and continuing through January 1984. It should be noted that the forecasts based on information through January 1984, correspond to the unrevised data as presented in the H.6 release of February 10, 1984, and not the revised data initially presented in Chairman Volcker's testimony and subsequently in the H.6 release of February 16, 1984. The latter data incorporate new benchmarks, new computations of the seasonal factors, and a new definition of the $M_3$ aggregate. In order to construct forecasts
corresponding to the new revisions, we would need the historical series for all of
the components of the monetary aggregates in order to reestimate our ARIMA
models for the various ratios. It is our understanding that the historical data will
not be available until approximately mid-March 1984, so at the moment we have
no choice but to present the forecasts on the old basis.

Our forecasting experience in the recent months has been comparable to
the results that we have tabulated at various times in the past. The mean error
for the one month ahead forecasts (3 observations) is .15 percent and the
corresponding root-mean-squared-error is .52 percent. When we advance to a
two month forecasting horizon (4 observations) the mean error is -.26 percent
and the root-mean-squared-error is .68 percent. On a three month horizon there
are only three observations, so the sample is so small that computation of any
error statistic is not very meaningful. On the surface it would appear that the
forecasting performance deteriorates when we advance this far, but this
conclusion can be heavily influenced by one month's observation.

The forecasts for the next six months suggest very little, if any, change in
the multiplier in the near future. The forecasted values decline slightly in March
and April, but then recover to the January level by June and July of 1984. Of
course, it should be kept in mind that the models are naive with respect to the
change from lagged reserve requirements to contemporaneous reserve
requirements that has just taken place. It is possible that the uncertainty
associated with this change may cause an increase in the demand for excess
reserves by banks, at least temporarily. If such an increase should occur, then
the observed reserve ratio would be higher than that forecasted by our ARIMA
model, and the partial effect of this influence on the multiplier would be that the
actual value would turn out lower than the predicted value.
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<td>(-.78)</td>
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<td>Jan.,* 1984</td>
<td>2.5995**</td>
<td>2.6020</td>
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* Prior to revised data announced in M.6 release of 2/16/84
**Actual multiplier
Note: Numbers in parentheses are percentage forecast errors

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<th>Percent</th>
<th>1 Month Forecasts (5)</th>
<th>2 Month Forecasts (4)</th>
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<td>Mean Error</td>
<td>.15</td>
<td>-.26</td>
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<td>RMSE</td>
<td>.52</td>
<td>.68</td>
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FROM: Bob Rasche
SUBJECT: Seasonally Adjusted Multiplier Forecasts

As you know, the multiplier forecasts that Jim Johannes and I have been constructing are developed from not seasonally adjusted component ratio data, and hence are forecasts of the not seasonally adjusted multiplier. The simplest way to construct a seasonally adjusted multiplier forecast is to use the seasonal factors prepared by the Board of Governors and the St. Louis Fed in February of each year, and which are used to seasonally adjust the data for the coming year. This eliminates any forecast error from errors in forecasting the seasonal factors.

The Board of Governors seasonally adjusts the components of MI separately. Their seasonal factors are published on p. 200 of the March, 1983 Federal Reserve Bulletin. In contrast, the St. Louis Fed seasonally adjusts the whole adjusted monetary base, not its components. They have sent me their seasonal factors for 1983 (attached).

The seasonal factors are defined in all cases such that

\[
\frac{X \text{ (NOT SEASONALLY ADJUSTED)}}{X \text{ (SEASONALLY ADJUSTED)}} = \text{SEASONAL FACTOR FOR } X.
\]

Therefore we can write:

\[
(1) \quad \frac{MI(SA)}{BASE(SA)} = \frac{CUR(SA) + TC(SA) + DD(SA)}{BASE(SA)}
\]

where

- \(CUR(SA)\) = currency (seasonally adjusted)
- \(TC(SA)\) = travelers checks (seasonally adjusted)
- \(DD(SA)\) = demand and other checkable deposits (seasonally adjusted)

We can use the above definition for seasonal factors (SF) to write this in terms of the not seasonally adjusted data:

\[
(2) \quad \frac{MI(SA)}{BASE(SA)} = \frac{CUR(NSA)}{BASE(NSA)} + \frac{TC(NSA)}{BASE(NSA)} + \frac{DD(NSA)}{BASE(NSA)} - \frac{CUR(SF)}{BASE(SF)} - \frac{TC(SF)}{BASE(SF)} - \frac{DD(SF)}{BASE(SF)}
\]
Now divide through the top and bottom of (2) by $\frac{DD(\text{NSA})}{DD(\text{SF})}$

\begin{align*}
(3) \quad M(\text{SA})_{\text{BASE}} &= \frac{\text{CUR(\text{NSA})}}{\text{DD(\text{NSA})}} \cdot \frac{\text{DD(\text{SF})}}{\text{CUR(\text{SF})}} + \frac{\text{TC(\text{NSA})}}{\text{DD(\text{NSA})}} \cdot \frac{\text{DD(\text{SF})}}{\text{TC(\text{SF})}} + 1 \\
&= \frac{\text{BASE(\text{NSA})}}{\text{DD(\text{NSA})}} \cdot \frac{\text{DD(\text{SF})}}{\text{BASE(\text{SF})}}
\end{align*}

But $\frac{\text{CUR(\text{NSA})}}{\text{DD(\text{NSA})}} = k$

$\frac{\text{BASE(\text{NSA})}}{\text{DD(\text{NSA})}} = (r + 1)(1 + t_1 + t_2 + g + z) + k$

As forecast by the Johannes-Rasche models and

\begin{align*}
\left[ \begin{array}{c} \text{TC(\text{NSA})} \\ \text{DD(\text{NSA})} \\ \text{CUR(\text{NSA})} \\ \text{DD(\text{SF})} \\ \text{CUR(\text{SF})} \\ \text{TC(\text{SF})} \end{array} \right] &= \left[ \begin{array}{c} \text{CUR(\text{NSA})} \\ \text{DD(\text{NSA})} \\ \text{CUR(\text{SF})} \\ \text{DD(\text{SF})} \\ \text{TC(\text{SF})} \end{array} \right] \\
&= \frac{\text{DD(\text{SF})}}{\text{CUR(\text{SF})}} \cdot \text{CUR(\text{SF})} \\
&= \frac{\text{DD(\text{SF})}}{\text{TC(\text{SF})}} \cdot \text{TC(\text{SF})}
\end{align*}

Let $\left[ \begin{array}{c} \text{DD(\text{SF})} \\ \text{CUR(\text{SF})} \\ \text{TC(\text{SF})} \end{array} \right] = S_b^* \cdot \left[ \begin{array}{c} \text{CUR(\text{SF})} \\ \text{TC(\text{SF})} \end{array} \right] = S_t$

Then

\begin{align*}
M(\text{SA})_{\text{BASE}} &= \frac{1 + (S_b^* k)(1 + S_t^* k)}{(r + 1)(1 + t_1 + t_2 + g + z) + k} S_b
\end{align*}