Revenue Forecast Errors and Business Cycles: The Case of Wisconsin

Romina Soria
Wisconsin Department of Revenue
FTA, October 2011
Motivation

“The troubling, long-term trend is that overestimates have gotten larger during each of the past three economic downturns, and more states have made them.”

“Errors in revenue estimates have worsened progressively during the fiscal crises that have followed the past three economic downturns.”

Wisconsin Forecast Schedule

• The Department of Revenue presents revenue forecasts to the Governor by November of each even-numbered year as part of the biennial budget process, (e.g., in November 2010 the forecast includes FY11, FY12 and FY13).

• Therefore, the forecast leads the end of each FY by 8, 20 and 32 months.

• Additional independent forecasts are prepared by the Legislative Fiscal Bureau for the Legislature.
Have Wisconsin revenue estimates worsened progressively?

It seems so looking at the raw forecast error of the last 23 years…
...It was expected given the magnitude of the decline in each of the last three recessions...
…But to make a valid assessment we should:

- Look into a **longer history** to determine if there is a long-term trend of worsening GPR forecast errors and

- Look at the forecast errors **adjusted** by some measure that captures the magnitude of each recession in order to make them comparable over time.
Taking a longer history, there is not a long-term trend of worsening forecast error.
No long-term trend at the 20 months lead forecasts either...

![20 Months Lead-GPR Forecast Error Chart](image-url)
...But to determine if there is a trend of the forecast errors over cycles, we should adjust the errors by the magnitude of the recessions.

In order to make forecast errors comparable over time, the errors were weighted by the normalized change in personal income as follows:
Weighted forecast error with normalized personal income change

- $\text{Weighted error}_i = \text{Forecasted error}_i \times \text{Personal income change index}_i$

- $\text{Forecast error}_i = \text{Forecasted GPR}_i \times \text{Actual GPR}_i$

- $\text{PIC index}_i = \frac{\frac{Y_i - Y_{i-1}}{Y_{i-1}}}{\frac{Y_{74} - Y_{73}}{Y_{73}}}$

- $\text{WE}_i = \frac{\text{Forecasted GPR}_i - \text{Actual GPR}_i}{\text{Actual GPR}_i} \times \left(\frac{Y_i - Y_{i-1}}{Y_{i-1}} \times \frac{Y_{73}}{Y_{74} - Y_{73}}\right)$
Evidence shows no worsening trend of GPR forecast errors
Again, no long-term worsening trend in the 32-months lead GPR forecast errors
What can be done to minimize errors during recessions? The case of the 2007-09 recession
The large error for FY09 in November of 2006 could not have been avoided given the national economic forecast.

No major forecasters were anticipating even a deceleration in November of 2006 or 2007.

There were 6M less jobs in FY09 and 13M in FY10 and FY11 than what Global Insight forecasted in November 2006.
Unprecedented declines of tax bases…Personal income declined for the first time in 50 years
Consumption always grew above 4%, but declined for the first time in 2009
## Baseline vs. Pessimistic Scenarios

<table>
<thead>
<tr>
<th>November 2008 + Law Changes Budget 2009</th>
<th>FY09</th>
<th>FY10</th>
<th>FY11</th>
<th>FY09-FY11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual</td>
<td>12,113</td>
<td>12,132</td>
<td>12,912</td>
<td></td>
</tr>
<tr>
<td>Official = Baseline 70%+ Pessimistic 30</td>
<td>12,804</td>
<td>12,844</td>
<td>13,340</td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>691</td>
<td>712</td>
<td>428</td>
<td>1,831</td>
</tr>
<tr>
<td>% Error</td>
<td>5.7%</td>
<td>5.9%</td>
<td>3.3%</td>
<td>4.7%</td>
</tr>
<tr>
<td>Baseline</td>
<td>12,838</td>
<td>12,982</td>
<td>13,509</td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>725</td>
<td>851</td>
<td>597</td>
<td>2,173</td>
</tr>
<tr>
<td>% Error</td>
<td>6.0%</td>
<td>7.0%</td>
<td>4.6%</td>
<td>5.5%</td>
</tr>
<tr>
<td>Pessimistic</td>
<td>12,726</td>
<td>12,517</td>
<td>12,941</td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>613</td>
<td>386</td>
<td>29</td>
<td>1,028</td>
</tr>
<tr>
<td>% Error</td>
<td>5.1%</td>
<td>3.2%</td>
<td>0.2%</td>
<td>2.7%</td>
</tr>
</tbody>
</table>
Two key decisions helped to avoid a larger forecast error in November 2008:

• I developed a new PIT model that reacted more timely to turning points because:
  – Quarterly instead of annual model.
  – Collections data rather than aggregated statistics.

   This reduced the error by $210 million over the three FYs.

• I decided to use a blend of the Baseline and the Pessimistic scenario from Global Insight.

   This reduced the error by $340 million over the three FYs.
Conclusions

• There is not a long-term trend of worsening forecast errors in Wisconsin.

• With the appropriate analysis, I would guess that this is also the case for most states.

• The reason for the recent revenue volatility is simply economic volatility. The last recession showed an unprecedented decline in economic activity.

• The high volatility of capital gains only accounted for one percentage point of the 7.8% decline in net tax for tax year 2009.
Conclusions (cont.)

• Timely data and timely models will help to pick up turning points more quickly.

• Consider the use of the pessimistic scenario when incorporating the national forecast.

• Future research: analyze microdata to get a better understanding of final settlement payments (refunds and final payments).