Revenue Forecasting Practices: Accuracy, Transparency and Political Acceptance
"And now the 7-day forecast..."
Why is revenue forecasting important?

• In a balanced budget environment, the revenue estimate *constrains* expenditures

• *Accuracy is difficult* to achieve

• A key element of fiscal discipline is that political actors *accept and abide* by the revenue estimate

• Theoretically, transparency keeps forecasters *accountable* for accurate and politically acceptable forecasts
Literature Review

• **Accuracy**
  – Academic literature supports combining forecasts and using independent experts to increase accuracy in forecasts
  – The verdict is still out on consensus forecasting
    • Survey data show some states adopt consensus forecasts to increase accuracy*

• **Transparency**
  – Government Finance Officers’ Association (GFOA) and others recommend disclosing the macroeconomic trends (GDP, inflation, etc.) that underpin the forecast

• **Political Acceptance**
  – A number of authors recommend consensus forecasting to reduce political contention
  – 28 states have adopted consensus forecasting

Research Questions

• What are the forecasting processes used in the states?
• How accurate are the revenue forecasts?
• How transparent are states in supporting their forecast methodology?
• Is there any obvious relationship between the forecasting process, accuracy, transparency, and political acceptance?
• What does the contextual detail around revenue forecasting practices tell us about assessing forecasting accuracy, transparency, and political acceptance?
Methods

• Volcker Alliance data on revenue forecasting processes, revenue growth projection rationales, and midyear budget adjustments
  – Includes rich contextual detail on forecasting practices for five states (GA, NC, SC, MD and VA)

• Additional research
  – National Association of Budget Officers (NASBO) *Fiscal Survey of the States* data: used to calculate forecasting error
Forecasting Processes

• Three types of forecasting processes: separate, executive and consensus

• Forecasting processes (especially consensus forecasts) vary widely

• In North Carolina, the lead executive and legislative economists get together to informally agree on an estimate

• In Virginia, there are two groups, a staff group that looks at methodology and a political group that reviews the forecast and overall economic climate

• In Florida, there are a series of conferences around estimating different elements of the expenditure and revenue forecasts
Accuracy
**Accuracy of Consensus States**

**All States**
Mean Absolute Percent Error = 4%
Median Absolute Percent Error = 2.5%

**Consensus States**
Mean Absolute Percent Error = 3.6%
Median Absolute Percent Error = 2.5%

*FY17 numbers are based on estimated actuals.
**FY17 midyear adjustment data not included because FY17 was ongoing at time of data collection.*

<table>
<thead>
<tr>
<th>State</th>
<th>FY15 Percent Error</th>
<th>FY15 Midyear Adjustment?</th>
<th>FY16 Percent Error</th>
<th>FY16 Midyear Adjustment?</th>
<th>FY17 Percent Error</th>
<th>State Percent Error</th>
<th>State Absolute Percent Error</th>
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</table>

Table 1. Did the state need to make a meaningful midyear budget adjustment?
### Accuracy of Executive States

#### Table 1. Did the state need to make a meaningful midyear budget adjustment?

<table>
<thead>
<tr>
<th>State</th>
<th>FY15 Percent Error</th>
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<th>State Percent Error</th>
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</tbody>
</table>

**FY17 numbers are based on estimated actuals**

**FY17 midyear adjustment data not included because FY17 was ongoing at time of data collection**

### All States

- Mean Absolute Percent Error = 4%
- Median Absolute Percent Error = 2.5%

### Executive States

- Mean Absolute Percent Error = 7.6%
- Median Absolute Percent Error = 4%
### Accuracy of Separate States

<table>
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<th>State</th>
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<th>FY15 Midyear Adjustment?</th>
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<th>FY16 Midyear Adjustment?</th>
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<td>2.5%</td>
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</tbody>
</table>

*FY17 numbers are based on estimated actuals
**FY17 midyear adjustment data not included because FY17 was ongoing at time of data collection
Accuracy Results

• Average forecast error (4%) is slightly bigger than 3.3% error rate reported in other research*

• There does not appear to be a relationship between accuracy and consensus forecasts for the time period studied (FY15, FY16, and FY17)

• However, the wide variation in how the forecast is used makes it difficult to assess accuracy

• The revenue forecast is not always the same as what the state anticipates it will receive in revenues

• We found several examples where forecast appeared to be used as a policy lever

Example of Policy-Influenced Forecast

• “Given that Governor Nathan Deal has publicly committed to rebuilding Georgia’s revenue shortfall reserves to over $2 billion before he leaves office and given this pre-commitment of part of the reserve to K-12 education, by extension, the state’s revenue estimates must reflect an implicit policy choice to low-ball the revenue estimates which then allows the state to both recoup the funds allocated through the K-12 reserve and also to rebuild the overall Revenue Shortfall Reserve.

• In sum, the revenue estimate is not a formal estimate in the sense of showing methodology and actual projections of anticipated revenues; instead, the revenue estimate proposed in the Governor’s Budget Report reflects the amount that the Governor wants to spend.”

*Georgia Question 4 Response, Georgia State University, Volcker Alliance’s 2016-2017 “Truth and Integrity in Government Finance” (Report forthcoming)
Virginia FY15/FY16 Biennium Budget

Virginia used an inaccurate revenue forecast to access the Rainy Day Fund.

The state was able to access $705 million to help build the budget.

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<th>First Year</th>
<th>Second Year</th>
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Transparency
# Transparency of Consensus States

## All States
Mean Absolute Percent Error = 4%
Median Absolute Percent Error = 2.5%

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<tr>
<th>State</th>
<th>FY15 Percent Error</th>
<th>FY15 Reasonable Rationale?</th>
<th>FY16 Percent Error</th>
<th>FY16 Reasonable Rationale?</th>
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*FY17 numbers are based on estimated actuals

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Table 2. Did the state have a reasonable rationale for revenue growth projections?
Transparency of Executive States

Table 2. Did the state have a reasonable rationale for revenue growth projections?

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*FY17 numbers are based on estimated actuals

All States
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Median Absolute Percent Error = 2.5%

Executive States
Mean Absolute Percent Error = 7.6%
Median Absolute Percent Error = 4%
## Transparency of Separate States

### All States

Mean Absolute Percent Error = 4%

Median Absolute Percent Error = 2.5%

### Separate States

Mean Absolute Percent Error = 2.3%

Median Absolute Percent Error = 2.1%

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*FY17 numbers are based on estimated actuals*

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<td>0.7%</td>
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<tr>
<td>Montana</td>
<td>2.9%</td>
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<td>-5.8%</td>
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<td>New Hampshire</td>
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<td>6.4%</td>
<td>4.8%</td>
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<tr>
<td>New Jersey</td>
<td>1.7%</td>
<td></td>
<td>-2.1%</td>
<td>-0.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ohio</td>
<td>2.3%</td>
<td></td>
<td>-2.6%</td>
<td>-2.9%</td>
<td></td>
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<tr>
<td>Pennsylvania</td>
<td>5.6%</td>
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<td>N/A</td>
<td>-5.0%</td>
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<tr>
<td>South Dakota</td>
<td>-0.8%</td>
<td></td>
<td>0.3%</td>
<td>-1.7%</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Wisconsin</td>
<td>-1.2%</td>
<td></td>
<td>-0.7%</td>
<td>-1.0%</td>
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</tr>
<tr>
<td>Mean</td>
<td>1.6%</td>
<td></td>
<td>0.0%</td>
<td>-0.9%</td>
<td></td>
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</tr>
<tr>
<td>Median</td>
<td>2.1%</td>
<td></td>
<td>-0.7%</td>
<td>-1.0%</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Transparency Results

• Most states include macroeconomic trends in their forecasting documents in a general way

• There does not appear to be a relationship between transparency in the forecast and accuracy for the time period studied

For example:

– Alabama does not disclose macroeconomic trends used at all, but had a 0.4% mean absolute percent error

– Hawaii describes macroeconomic trends – earned a 4% mean absolute percent error overall
# Arkansas Assumptions

## Economic Assumptions

<table>
<thead>
<tr>
<th>Economic Assumption</th>
<th>FY 2017</th>
<th>FY 2018</th>
<th>FY 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. GDP Nominal (Billion $)</td>
<td>18,970.9</td>
<td>19,882.6</td>
<td>20,785.9</td>
</tr>
<tr>
<td>U.S. GDP Real (Billions 2009$ Chain-Weight)</td>
<td>16,847.0</td>
<td>17,263.1</td>
<td>17,684.2</td>
</tr>
<tr>
<td>U.S. GDP Deflator (Chain-Wt, 2009=100)</td>
<td>112.6</td>
<td>115.2</td>
<td>117.5</td>
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<tr>
<td>U.S. CPI Price Index (1984=100)</td>
<td>243.1</td>
<td>248.4</td>
<td>253.5</td>
</tr>
<tr>
<td>OIL - Avg. Dom. Crude to Refinery ($ per barrel)</td>
<td>50.2</td>
<td>52.9</td>
<td>56.6</td>
</tr>
<tr>
<td>AR. Net General Revenue (Million $)</td>
<td>5,941.8</td>
<td>6,170.0</td>
<td>6,372.3</td>
</tr>
<tr>
<td>AR. Net GR % of Non-Farm Personal Income</td>
<td>5.0</td>
<td>5.0</td>
<td>4.9</td>
</tr>
<tr>
<td>AR. Non-Farm Personal Income (Million $)</td>
<td>118,704.2</td>
<td>124,304.5</td>
<td>130,696.7</td>
</tr>
<tr>
<td>AR. Wage &amp; Salary Disbursements (Million $)</td>
<td>56,206.3</td>
<td>59,094.3</td>
<td>62,213.8</td>
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<tr>
<td>AR. Non-Farm Proprietor Income (Million $)</td>
<td>7,437.7</td>
<td>7,852.1</td>
<td>8,184.1</td>
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<tr>
<td>AR. Per Capita Income ($)</td>
<td>39,977.7</td>
<td>41,587.9</td>
<td>43,491.4</td>
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<tr>
<td>AR. GDP Nominal (Million $)</td>
<td>125,061.0</td>
<td>130,651.3</td>
<td>136,173.5</td>
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<tr>
<td>AR. Employment Total Payroll (Thousands)</td>
<td>1,234.2</td>
<td>1,250.5</td>
<td>1,262.8</td>
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<tr>
<td>AR. Employment Private Sector (Thousands)</td>
<td>1,020.8</td>
<td>1,037.5</td>
<td>1,048.6</td>
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<tr>
<td>AR. Employment Manufacturing (Thousands)</td>
<td>153.3</td>
<td>154.5</td>
<td>156.5</td>
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<tr>
<td>AR. New Car/Light Truck registrations (Thous.)</td>
<td>142.8</td>
<td>139.7</td>
<td>138.6</td>
</tr>
<tr>
<td>AR. Retail Sales (Million $)</td>
<td>41,590.1</td>
<td>43,139.6</td>
<td>45,157.6</td>
</tr>
</tbody>
</table>
Estimates of new construction linked to Ad Valorem Tax estimate
Virginia Calculation

Individual Income Tax - Withholding

diffya(with)

= 0.00616 * diffya(ywstran) + 39.7988
   (3.58883)   (2.67087)

Equation to calculate predicted value of withholding tax receipts

<table>
<thead>
<tr>
<th>Sum Sq</th>
<th>R Sq</th>
<th>D.W.( 1)</th>
<th>Std Err</th>
<th>LHS Mean</th>
<th>R Bar Sq</th>
<th>F</th>
<th>3, 43</th>
<th>4.0815</th>
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<tr>
<td>120278</td>
<td>0.2216</td>
<td>2.1104</td>
<td>52.8883</td>
<td>87.4778</td>
<td>0.1673</td>
<td>1.9792</td>
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</tbody>
</table>

Quarterly data for 47 periods from 2005Q1 to 2016Q3

Past Income

diffya with ywstran

Year-over-year difference function
Withholding tax receipts
Virginia income from wages and salaries and transfer payments
Political Acceptance
Political Acceptance

• For the five states we looked at in depth (GA, SC, NC, VA and MD), we tracked the forecast through the budget process and various documents produced
  — Executive and legislature both built budgets off of revenue forecast; no unexpected changes.

• Review of question responses by other staff on Volcker Alliance project – no one observed contention around the forecast
Political Acceptance (continued)

• Could be that consensus forecast was adopted to reduce contention around the forecast; could be that years we looked at were not particularly contentious

• However, no evidence that revenue estimate was disputed during FY15, FY16 and FY17.
Conclusions

• Most states have a consensus forecast, but these processes vary widely
• The relationship between consensus forecasts and accuracy and transparency is difficult to determine
• Forecasts sometimes do not truly reflect what the state anticipates receiving in revenues
• Researchers should be aware that forecasts exist within institutional frameworks that can affect their accuracy