Leading Indicators of Cyclical State Revenues: Beyond the Regional Indicators

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A Priori Questions

1. Are revenue forecasts degraded by regional data problems?
2. Are leading indicators present in the revenue lines?
3. Are state-specific LEI constructions possible with selected revenue lines?
4. Is a two-stage forecast model efficient for revenue forecasting? Are the models stable (and representative)?
5. Have regression models for revenue forecasting been abandoned prematurely?
Related Literature


Regional Economic Data Concerns
(Questioning the Sausage Factory Results)

The Arkansas Case: Small State Issues

• Labor Force Data: Components of the Household Survey and the Regional Averaging Methodology

• Personal Income: Revision Rate and Component Volatility

• Housing and Auto Consumption Measures: Issues of Revision Processes and Coverage

• GSP and Others: An Issue of Timeliness
Arkansas Unemployment Rate: Unrevised Monthly Data

Nonfarm Employment Growth in Arkansas

Source: Arkansas Dept. of Workforce Services
Annual Growth in Arkansas Gross General Tax Collections

Source: DFA, Economic Analysis and Tax Research

Percent Change

10-year Growth Average (95-05)
4.8%

Special Items:
see components

*Expanded services is included in gross general revenue but not in net available revenue

Annual Growth in Arkansas Sales Tax Collections

Source: DFA, Economic Analysis and Tax Research

*Expanded services is included in gross general revenue but not in net available revenue
Annual Growth in Arkansas Use Tax Collections

- 10-year Growth Average (95-05): 5.1%
- Rate Changes & Special Items: None

Source: DFA, Economic Analysis and Tax Research

Annual Growth in Individual Income Tax Revenue

- 10-year Growth Average (95-05): 6.0%
- Rate Changes & Special Items:
  - Tax changes (99-00), 3% surcharge (04-05), surcharge dropped (06)

Source: DFA, Economic Analysis and Tax Research
Structural Model Framework

Traditional Model Approach (1 or 2-Step)
\[ Y_t = \beta_0 + \beta_1 X_t + \beta_2 Z_t + \varepsilon_t \]

Where \( X \) is a vector of region-specific exogenous variables and \( Z \) is a vector of national, sector-specific, leading or coincident indicators

Modified Regional Approach
\[ Y_t = \beta_0 + \beta_1 X_t + \beta_2 Z_t + \beta_2 R_{t-k} + \varepsilon_t \]

Where \( R_{t-k} \) is a vector of distributed lag formulations for select revenue series with cycle-leading characteristics

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Table 1: Variable Definitions and Descriptive Statistics

<table>
<thead>
<tr>
<th>Description</th>
<th>Variable</th>
<th>Mean</th>
<th>(Std. Dev.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Tax Revenue Per One Car SA</td>
<td>ED1</td>
<td>44275.4</td>
<td>(11072.4)</td>
</tr>
<tr>
<td>Individual Income Tax Withholding SA</td>
<td>Indit</td>
<td>209.11</td>
<td>(0.2879)</td>
</tr>
<tr>
<td>Use Tax Revenue Per One Car SA</td>
<td>Utax</td>
<td>17.08</td>
<td>(0.898)</td>
</tr>
<tr>
<td>Total Private Employment, SA</td>
<td>Bran</td>
<td>0.0012</td>
<td>(0.0017)</td>
</tr>
<tr>
<td>Producers Price Index: Industrial Energy Users</td>
<td>PPI1</td>
<td>139.29</td>
<td>(0.2638)</td>
</tr>
<tr>
<td>Producers Price Index: Gas Fuels</td>
<td>PPI2</td>
<td>139.71</td>
<td>(0.6902)</td>
</tr>
<tr>
<td>U.S. Nonresidential Fixed Investment</td>
<td>Nonresi</td>
<td>993.31</td>
<td>(0.5251)</td>
</tr>
<tr>
<td>U.S. Corp Profit Before Tax</td>
<td>Bldkap</td>
<td>796.96</td>
<td>(0.5072)</td>
</tr>
<tr>
<td>CPI: Excluding Energy and Food</td>
<td>Cpiex</td>
<td>0.1796</td>
<td>(0.1729)</td>
</tr>
<tr>
<td>Dummy Var for Sep 11</td>
<td>Du11</td>
<td>1.0000</td>
<td>(0.0000)</td>
</tr>
<tr>
<td>U.S. Wage and Salary Earnings</td>
<td>Wages</td>
<td>0.0000</td>
<td>(0.0000)</td>
</tr>
<tr>
<td>Real Estate Transfer Tax: Value of Transactions</td>
<td>Real</td>
<td>0.0000</td>
<td>(0.0000)</td>
</tr>
<tr>
<td>Franchise Tax Revenue Series</td>
<td>Franchise</td>
<td>0.0000</td>
<td>(0.0000)</td>
</tr>
<tr>
<td>Dummy Variable for Two State Change in Service</td>
<td>Subjec2</td>
<td>0.0000</td>
<td>(0.0000)</td>
</tr>
<tr>
<td>Sales and Use Tax from New Vehicle Sales</td>
<td>Autotot</td>
<td>10.6612</td>
<td>(0.2879)</td>
</tr>
</tbody>
</table>
Conclusions

- An improved set of leading indicators with local reference may be present in state revenue series.

- Small revenue lines may be good candidates for structural forecast models of major revenue sources.

- Other uses of leading measures with included revenue lines may include turning point probability models and improved LEI instruments.

- Regional (and macro) data problems will not be eliminated, but they may be reduced with carefully tested revenue indicator variables.
Questions?