Formula Apportionment: Revenue Implications

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Change in Taxable Income

\[ \Delta T_t = T_t - T_{t-1} = (\phi_t \pi_t + \alpha_t) - (\phi_{t-1} \pi_{t-1} + \alpha_{t-1}) \]

\[ \phi_t = s \frac{\text{Local Sales}}{\text{Total Sales}} + p \frac{\text{Local Payroll}}{\text{Total Payroll}} + r \frac{\text{Local Property}}{\text{Total Property}} \]

\[ \alpha_t = \text{Net Allocated Locally} \]
Decomposing Changes in Taxable Income

\[ \Delta T_t = T_t - T_{t-1} = (\phi_t \pi_t + \alpha_t) - (\phi_{t-1} \pi_{t-1} + \alpha_{t-1}) \]

add and subtract:
\[ \phi_{t-1} \pi_t , \phi_t^E \pi_t , \phi_{t-1}^E \pi_t \]

\[ \Delta T_t = \left[ \left( \phi_t - \phi_t^E \right) \cdot \left( \phi_t^E - \phi_{t-1}^E \right) \cdot \left( \phi_{t-1}^E - \phi_{t-1} \right) \right] \pi_t + \phi_{t-1} \left( \Delta \pi_t \right) + \Delta \alpha_t \]

Technical Apportionment Effect

[1] and [3]

\[ \left[ \left( \phi_t - \phi_t^E \right) \cdot \left( \phi_t^E - \phi_{t-1}^E \right) \cdot \left( \phi_{t-1}^E - \phi_{t-1} \right) \right] \pi_t \]

- Initial Year: [3] is zero and [1] depends on market vs. production orientation
- Subsequent Years: [1] and [3] approximately cancel out
Technical Apportionment Effect

"Market State" if and only if:

\[
\sum \pi_i \left( \frac{\text{Local Sales}}{\text{Total Sales}} \right)_i - \frac{1}{2} \left( \frac{\text{Local Property}}{\text{Total Property}} + \frac{\text{Local Payroll}}{\text{Total Payroll}} \right)_i > 0
\]

- "Market State" \(\rightarrow\) revenue positive
- "Production State" \(\rightarrow\) revenue negative

Estimating the Technical Apportionment Effect

- Is very easy to do
- For the last year of available data, calculate the tax liability of all multistate corporations under new regime and subtract actual tax liability for that year
- Inflate the number as appropriate to reflect likely growth in taxable income
Location of Factors Effect [2]

\[ \left[ \phi_t^E - \phi_t^E \right]_{[1]} + \left[ \phi_t^E - \phi_{t-1}^E \right]_{[2]} + \left[ \phi_{t-1}^E - \phi_{t-1}^E \right]_{[3]} \right] \pi_t \]

- Arises because property and payroll are stimulated by the change and sales are discouraged by the change
- See Edmiston (2002, June, NTJ)

Effects on Corporate Income Tax Collections

- The net effect on corporate income tax revenues will depend on how strongly the location of additional payroll and property are encouraged and how strongly sales are discouraged
- If moving to single factor, the location of factors effect will be revenue negative with respect to the corporate income tax base
Location of Factors Effect
Effects on Other Tax Bases

- Increases in corporate payroll should expand the individual income and sales tax bases
- Increases in corporate property should expand the property tax base and may have a moderate positive impact on individual income and sales tax bases
- Decreases in corporate sales should reduce the sales tax base

Estimating the Location of Factors Effect

- If a previous change has been made, the elasticity of the factors can be estimated via regression of the factors on tax differentials.
- See Edmiston and Arze (2002) for a suggested procedure [will be presented at the 2004 NTA Conference in Minneapolis]
- Or perhaps use the Edmiston and Arze estimates for the State of Georgia
### Edmiston and Arze (2002) Elasticity Estimates

<table>
<thead>
<tr>
<th>Factor</th>
<th>Elasticity</th>
<th>Change from EWF to DWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>-0.116</td>
<td>-5.8%</td>
</tr>
<tr>
<td>Payroll</td>
<td>-0.040</td>
<td>+1.0%</td>
</tr>
<tr>
<td>Property</td>
<td>-0.035</td>
<td>+0.9%</td>
</tr>
</tbody>
</table>

### Edmiston, 2004, STN, Table 2
Analysis of Personal Income Tax Collections (from payroll)

<table>
<thead>
<tr>
<th>Item</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payroll (Benchmark)</td>
<td>58,026,299,561</td>
<td>66,706,644,368</td>
<td>63,386,989,176</td>
<td>66,067,333,983</td>
<td>68,747,678,791</td>
</tr>
<tr>
<td>Payroll (SFS)</td>
<td>59,399,732,259</td>
<td>63,614,402,264</td>
<td>67,995,310,102</td>
<td>70,870,319,648</td>
<td>73,745,729,194</td>
</tr>
<tr>
<td>Payroll Gain</td>
<td>1,373,432,698</td>
<td>2,907,757,896</td>
<td>4,668,320,926</td>
<td>4,803,185,665</td>
<td>4,998,050,403</td>
</tr>
<tr>
<td>Additional PIT (Low)</td>
<td>32,413,012</td>
<td>68,623,086</td>
<td>108,756,374</td>
<td>113,355,182</td>
<td>117,953,990</td>
</tr>
<tr>
<td>Additional PIT (High)</td>
<td>65,883,567</td>
<td>139,485,146</td>
<td>221,061,155</td>
<td>230,408,816</td>
<td>239,756,478</td>
</tr>
</tbody>
</table>
## Edmiston, 2004, STN, Table 3
### Net Revenue Effects

<table>
<thead>
<tr>
<th>Item</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate Income Tax</td>
<td>(101,721,495)</td>
<td>(109,444,350)</td>
<td>(117,433,696)</td>
<td>(125,495,449)</td>
<td>(133,732,061)</td>
</tr>
<tr>
<td>Personal Income Tax (low)</td>
<td>32,413,012</td>
<td>68,623,086</td>
<td>108,756,374</td>
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<td>65,883,567</td>
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<td>221,061,155</td>
<td>230,408,816</td>
<td>239,756,478</td>
</tr>
<tr>
<td>Net Revenue Effect (low)</td>
<td>(69,308,484)</td>
<td>(40,821,264)</td>
<td>(8,677,322)</td>
<td>(12,140,267)</td>
<td>(15,778,071)</td>
</tr>
<tr>
<td>Net Revenue Effect (high)</td>
<td>(35,837,929)</td>
<td>30,040,796</td>
<td>103,627,459</td>
<td>104,913,367</td>
<td>106,024,417</td>
</tr>
<tr>
<td>Net Revenue Effect (likely)</td>
<td>(52,573,206)</td>
<td>(5,390,234)</td>
<td>47,475,869</td>
<td>46,386,550</td>
<td>45,123,173</td>
</tr>
</tbody>
</table>

September 21, 2004  
FTA Revenue Estimating Conference  
K. Edmiston, FRB KC