State Corporate Income Tax Apportionment Policy:
Lessons Learned

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Outline

- Lessons from the effects on real economic activity
  - Employment
  - Investment (Gupta & Hofmann, 2003)
- Lessons from the behavioral response of firms
  - Gupta & Mills, 2002
- Preliminary lessons from the effects on state corporate income tax revenues
  - Gramlich, Gupta & Hofmann, 2004
Effects on Employment

- E.g., Goolsbee & Maydew (2000)
  "Coveting thy neighbor’s manufacturing: The dilemma of state income apportionment,"

- Use panel data from 1978 to 1994 to examine the effect of double-weighting the sales factor

- Results
  - Reducing the payroll factor weight from $1/3$ to $1/4$ (i.e., double-weighting the sales factor) increases manufacturing employment in the state by 1.1%
  - However, there are important negative externalities
    - Increase in jobs in the change-state is offset by a loss of jobs in other states
    - Thus, aggregate effects are close to zero

Effects on Investment

- Several studies
  - *Carlton (1979, 1983)* - examined location decisions of firms; state corporate tax rate not significant
  - *Papke (1987, 1991)* - regressed new capital expenditures on three measures of tax burden; only the simulated after-tax return measure was significant
    - *Tannenwald (1996)* - reexamined Papke’s result with newer data; tax effect was smaller and statistically insignificant
  - *Weiner (1996)* - found formula apportionment has no independent effect on capital-labor ratios and only marginally significant effects on capital spending when examining apportionment changes from 1982 to 1990
Gupta & Hofmann (2003)

“Research questions

- Do states with lower income tax burden on property experience a higher level of new capital spending by corporations?
  - \( \text{BURDEN} = (\text{top statutory tax rate}) \times (\text{property factor weight}) \)
- Do states with more investment-related tax incentives experience a higher level of new capital spending by corporations?
- Do the above effects differ in states whose tax base is determined using “unitary taxation” or a “throwback rule”?

Gupta & Hofmann (2003)

“Motivation

- The accelerating trend among states to change their apportionment formula to double-weighted sales or even 100% sales
- The proliferation of state tax incentives for business investment/employment
- The focus of prior research on one or two structural components of the state tax regime, with conflicting results.
Gupta & Hofmann (2003)

**The Apportionment Formula**

\[ x_i = \left( w_i^S \cdot \frac{s_i}{S} + w_i^L \cdot \frac{l_i}{L} + w_i^P \cdot \frac{p_i}{P} \right) \cdot \pi \cdot r_i \]

- \( x_i \) the firm’s income tax liability in state \( i \)
- \( \pi \) the firm’s nationwide (or worldwide) taxable income
- \( r_i \) the statutory tax rate in state \( i \)
- \( s_i, l_i, p_i \) the firm’s sales, payroll, and property in state \( i \)
- \( S, L, P \) the firm’s nationwide sales, payroll, and property
- \( w^S_i, w^L_i, w^P_i \) state \( i \)’s factor weights for sales, payroll, and property
  (the factor weights must sum to one)

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**Gupta & Hofmann (2003)**

Effects of Factor Apportionment

Distributing the rate and income terms, the apportionment formula transforms the state corporate income tax into separate taxes on sales, labor and property (McClure, 1980):

\[
\left( w_i^S \cdot r_i \cdot \frac{s_i}{S} \cdot \pi \right) + \left( w_i^L \cdot r_i \cdot \frac{l_i}{L} \cdot \pi \right) + \left( w_i^P \cdot r_i \cdot \frac{p_i}{P} \cdot \pi \right)
\]

When a firm acquires additional property in state \( i \), holding all else constant, its income tax liability will increase in the following manner:

\[ \Delta x_i = w_i^P \cdot r_i \cdot \Delta \frac{p_i}{P} \cdot \pi \]

**Hyp.1:** *Ceteris paribus*, new capital expenditures in a state are decreasing in its income tax BURDEN on property.
Gupta & Hofmann (2003)

Effects of Tax Incentives

- Investment-related incentives
  - Income tax credits for
    - investment expenditures
    - enterprise zone activities
    - job creation
    - research/development expenditures
  - Accelerated depreciation
  - Exemption of manufacturing facilities, equipment, supplies, and/or inventories from state sales and/or property taxes

- **Hyp.2**: *Ceteris paribus*, new capital expenditures in a state are increasing in investment-related tax incentives available in that state.

Gupta & Hofmann (2003)

Effects of Unitary Reporting Rules

- Firms in unitary states are
  - taxed on a broader income base
  - less able to use tax-planning to minimize state taxes
  - more responsive to tax rate changes

- **Hyp.3**: *Ceteris paribus*, new capital expenditures in unitary states are decreasing in the income tax *BURDEN* on property, and by a greater amount than in non-unitary states
Gupta & Hofmann (2003)
Effects of the Throwback Rule

- Firms in throwback states are
  - taxed on a larger proportion of income
  - more sensitive to tax rate or apportionment formula differences
- Hyp.4: Ceteris paribus, new capital expenditures in states employing the throwback rule are decreasing in the income tax BURDEN on property, and by a greater amount than in states not employing this rule.

Gupta & Hofmann (2003):
Empirical Procedures

- Data
  - New capital expenditures in the manufacturing sector (most complete data available)
  - 44 states with a corporate income tax
    - Omitted NV, SD, WY - no corporate income tax
    - Omitted MI, WA, TX - tax base other than income
  - 14 years of data (1983-1996)
  - 44*14 = 616 state-year observations
- Methodology
  - Controls for size of the manufacturing sector, census region, energy costs, public expenditures, state fixed-effects
  - Sensitivity tests: all 50 states, separation of rate and factor weight, annual regressions, varying definition of unitary
Trends in Sales Factor Weights in Apportionment Formulae, 1983-96
(Source: Gupta & Hofmann, 2003)

Trends in Tax Variables and New Capital Spending, 1983-96
(Source: Gupta & Hofmann, 2003)
Gupta & Hofmann (2003): Results

- See Table 3 of paper
- State corporate income tax policies do have a (statistically) significant influence on new capital spending in the state
  - New capital spending is declining in BURDEN, and increasing in investment-related tax incentives
- However, the estimated magnitude of these effects is VERY modest (economically insignificant)
  - 1% decline in BURDEN is associated with a $2-6 million increase in new capital spending
  - An additional investment-related incentive is associated with a $0.5-2.5 million increase in new capital spending

Gupta & Hofmann (2003): Conclusions

- Rates, apportionment factor weights, and investment-related incentives are more influential on new capital spending in unitary and/or throwback states
- Triangulating this study with prior research suggests the following hierarchy of the relative importance of state income tax regimes
  - Unitary/throwback definition of tax base
  - Tax rates/apportionment factor weights
  - Investment-related tax incentives
Firms’ Responses to Disconformity in States’ Apportionment Formulae

- Gupta & Mills (2002)
  - Investigate how firms use differences in state income tax regimes to lower their state tax burdens
  - Specifically, we examine relationship between firms’ state effective tax rate and
    - Number of states in which they file returns, and
    - A proxy for firms’ ability to shift income through sales factor apportionment
  - Develop a model that predicts that firms’ state effective tax rates (SETR) first increase and then decrease as a function of the number of states in which they file

Gupta & Mills (2002) Results

- Find evidence consistent with the model’s predictions
  - State ETRs are minimized at about 24 states
  - Reduction in state ETRs is associated with greater use of sales factor apportionment, widely recognized as the most common form of state tax planning
Mean State Effective Tax Rates
(Source: Gupta & Mills, 2002)

Gupta & Mills (2002)
Implications

- Firms adopt reporting and corporate structures to reduce their state income tax burdens
- The reduction of state ETRs as a function of number of states implies that disconformity between states potentially causes state tax revenues to decline
Effects on State Corporate Income Tax Revenues

- Several studies; example
  - Fox & Luna (2002)
    - Examines the extent to which state corporate income tax revenues have declined and possible causes
  - Edmiston (1999)
    - Uses simulations and a non-cooperative game to determine the optimal apportionment structure from different perspectives – finds that in terms of revenue optimality depends on whether the state is a production state or a market state

New Analysis

- Analysis of certain states that changed apportionment factor weights with neighboring no-change states
- 4 pairs of change v. no-change states
  - Arizona v. Utah
  - Maine v. Vermont
  - Nebraska v. Kansas
  - Oregon v. Colorado
- AZ, ME, NE and OR changed the weight on their sales factor in 1990-91
AZ v. UT: Average Annual Growth in State Corporate Income Tax Revenues

- 4-year period prior to AZ change in apportionment formula
- 2-year period surrounding change
- 4-year period following change
- 10-year period surrounding change

AZ v. UT: Average Annual Growth in Per-Capita State Corporate Income Tax Revenues

- 4-year period prior to AZ change in apportionment formula
- 2-year period surrounding change
- 4-year period following change
- 10-year period surrounding change
**AZ v. UT:** Average Annual Growth in State Corporate Income Tax Revenues as a Percentage of GSP

- Average Annual Growth Rate
  - Arizona
  - Utah
  - All States

- Periods:
  - 4-year period prior to AZ change in apportionment formula
  - 2-year period surrounding change
  - 4-year period following change
  - 10-year period surrounding change

**ME v. VT:** Average Annual Growth in State Corporate Income Tax Revenues as a Percentage of GSP

- Average Annual Growth Rate
  - Maine
  - Vermont
  - All States

- Periods:
  - 4-year period prior to ME's change in apportionment formula
  - 2-year period surrounding change
  - 4-year period following change
  - 10-year period surrounding change
### NE v. KS: Average Annual Growth in State Corporate Income Tax Revenues as a Percentage of GSP

<table>
<thead>
<tr>
<th>Period</th>
<th>Nebraska</th>
<th>Kansas</th>
<th>All States</th>
</tr>
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<tbody>
<tr>
<td>4-year period prior to change</td>
<td>-8%</td>
<td>-6%</td>
<td>-7%</td>
</tr>
<tr>
<td>2-year period surrounding</td>
<td>-6%</td>
<td>-5%</td>
<td>-6%</td>
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<tr>
<td>change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-year period following change</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>10-year period surrounding</td>
<td>2%</td>
<td>3%</td>
<td>2%</td>
</tr>
</tbody>
</table>

### OR v. CO: Average Annual Growth in State Corporate Income Tax Revenues as a Percentage of GSP

<table>
<thead>
<tr>
<th>Period</th>
<th>Oregon</th>
<th>Colorado</th>
<th>All States</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-year period prior to change</td>
<td>-10%</td>
<td>-10%</td>
<td>-9%</td>
</tr>
<tr>
<td>2-year period surrounding change</td>
<td>-8%</td>
<td>-9%</td>
<td>-9%</td>
</tr>
<tr>
<td>change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-year period following change</td>
<td>0%</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>10-year period surrounding change</td>
<td>2%</td>
<td>3%</td>
<td>2%</td>
</tr>
</tbody>
</table>
Summary of Analysis

- Reasons for the change in apportionment factor weights appear to be defensive rather than proactive
  - Three of the 4 change states (AZ, VT, and OR) were experiencing negative revenue growth prior to change
- Change appears to be followed by a strong growth in CIT revenues
  - But, three of four NON-change states had stronger growth in CIT revenues in the 4-year period following change
  - And over a 10-year period surrounding the change, there appears to be virtually no difference in the CIT revenue growth between change and non-change states
- Change in state corporate income tax revenues is consistent across scaling for population, GSP, etc.
  - Signs are in the same direction; magnitudes are proportional
- Caveat: choice of non-change state

Closing Remarks

- Effects of formula apportionment changes
  - Likely to have small, if any, effects on real economic activity, especially new capital investment
  - Initially there will be winners and losers, but firms will plan around the new rules
  - Long-term revenue effects unlikely to be significantly different from not changing the formula
- Overall, piecemeal changes to state corporate income tax regimes probably not a good idea