Fiscal Research Program

A SINGLE FACTOR SALES APPORTIONMENT FORMULA IN THE STATE OF GEORGIA

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Executive Summary

The State of Georgia, like all other U.S. states and the Canadian provinces, uses a formulary method to apportion the taxable income of multistate corporations, with the allocation of income to each state based on the relative distribution of the firm’s gross receipts (sales), employee compensation (payroll), and property in that state. States traditionally have given each of these three factors equal weight in the apportionment formula, but the trend in recent years has been to place a disproportionately heavy weight on the sales factor. This policy is intended to stimulate economic development in the state and to export part of the corporate tax burden to "out-of-state firms.” Georgia pursued such a policy in 1995, when it switched from an equally weighted formula to a modified formula which places a double weight on the gross receipts factor relative to the payroll and property factors. In the 2000 legislative session, a bill was introduced to change the apportionment formula again, this time to a single-factor sales formula, which would apportion the taxable income of multistate corporations exclusively on the basis of Georgia's share of their national gross receipts. While the bill was never brought to a vote, it is expected to be considered in the upcoming 2001 legislative session.

The purpose of this report is to provide objective, detailed information on the apportionment issue to elected officials, policy makers, corporations, and other interested parties in anticipation of the 2001 legislative session. The hope is that the analysis contained in this report will foster a reasonable, informed debate of the single-factor sales apportionment issue in the State of Georgia.

A. Formulary Apportionment and Strategic Apportionment Policies

The use of formulary apportionment renders an incidence pattern for state corporate income taxes that is in many ways very different from the standard incidence results for corporate income taxes – it is not a tax on accounting profits. A series of papers in the 1980s established that, to the extent tax rates vary across jurisdictions, formula-apportioned corporate income taxes are similar in their incidence to a set of implicit excise taxes on the apportionment factors. That is, the economic effects mimic the effects of sales taxes, payroll taxes, and property taxes. It stands to reason that placing a relatively greater weight on the sales factor (with commensurate reductions in property
and payroll factor weights) would diminish the implicit excise tax on productive factors and hence encourage business location or expansion. Moreover, firms with a large share of productive activity in the state relative to sales activity would see their tax liabilities diminish relative to sales-intensive firms, and hence corporate income taxes would in some sense be exported to out-of-state enterprises.

Despite the interest in strategic modification of apportionment formulas in state legislatures, the issue was largely ignored by the economics profession until very recently. Over the last few years, however, a series of papers has surfaced to expand the state of knowledge on this issue considerably.

Using cross-sectional data in a 1994 study, Joann Weiner of the U.S. Treasury Department found no relationship between the choice of apportionment formula and investment, but did find some weak evidence of a link in a later study, which used first-differences to control for fixed effects.¹ Using panel data over the period 1978-1994, Austan Goolsbee and Edward Maydew provided stronger evidence that heavier sales factor weights can have a positive economic development impact, suggesting that a move from an equally weighted three-factor formula to a double-weighted sales formula increases manufacturing employment by 1.1 percent on average.² Finally, Kenneth Klassen and Douglas Shackelford provided evidence that companies structure their shipments to reduce sales in states that place a relatively high assessment on gross receipts through their apportionment formulas.³

In a different approach, Edmiston used an eight-region applied general equilibrium model to simulate the effects of heavier sales factor weights on economic development and corporate tax revenues.⁴ He found that while heavier sales factor weights may have a significantly positive impact on economic development in the very long run, the short run effects are negligible. Moreover, he found that the economic development impact can vary substantially across states depending on the industrial structure and other characteristics of the state.

While there is still no consensus on the magnitudes of the effects, these findings do suggest that strategic apportionment policies are likely to be stimulative, although probably not by a tremendous degree, especially in the short run.
B. Strategic Apportionment Across the States: Where Does Georgia Stand?

Given the potential for economic development gains and significant tax exporting, it is not surprising that more and more states, including Georgia, have been amending their formulas to place a disproportionately heavy weight on the sales factor. Of the 48 states (including the District of Columbia) that impose corporate income taxes, 32 currently place a disproportionately heavy weight on the sales factor. A large majority of these states made the switch from an equally-weighted three factor formula in the 1990s, which underscores the increasingly competitive nature of both corporate income taxation policies and economic development policy more generally.

For the most part (Iowa is an exception), states have traditionally imposed a double-weighted sales formula when departing from an equally-weighted scheme; however, in recent years states have become more aggressive and increasingly have been modifying apportionment formulas to put an even greater weight on the sales factor. Nine states currently place greater than one-half weight on the sales factor, ranging from 60 percent in Ohio (triple-weighted sales) to a single-factor sales formula (100 percent weight on sales) in Iowa, Nebraska, and Texas. Illinois currently is phasing in a single-factor sales formula, which will come into play in January, 2001. Many other states that offer optional formulas with greater sales factor weights, including single-sales factor formulas.

Despite the competitiveness of apportionment policy across the states, the Southeastern states generally have not been as aggressive. None of the states adjacent to Georgia impose apportionment formulas with a sales factor weight greater than in Georgia (most also have double-weighted sales); nor do other Southeastern states, save for South Carolina and Mississippi, where optional formulas are pervasive.

C. Revenue Analysis

There are several ways in which strategic apportionment may affect the apportionment percentages of Georgia firms. First, if Georgia is a "market region" rather than a "production region," then placing a heavier weight on the sales factor will lead to greater revenues, all else equal. Because this factor ignores policy-induced shifts in sales
A Single Factor Sales Apportionment Formula In the State of Georgia

and production, we can think of the sales/production intensity factor as the “static,” or immediate revenue effect.

Second, to the extent that placing a greater weight on the sales factor drives away sales in the state, corporate tax revenues will be diminished because a reduction in Georgia’s share of total sales implies a reduction in its apportionment percentage, all else equal. Similarly, to the extent that a heavier sales factor weight encourages an inflow of production activity, revenues will be enhanced through increases in Georgia’s share of total firm property and/or payroll. We can think of these revenue impacts as “dynamic,” or longer-term effects.

In Edmiston’s multi-region applied general equilibrium studies of this issue, both the short-run and long-run versions of the simulation models suggested that the immediate or static revenue effect was the strongly dominant effect. That is, market regions, as defined above, saw revenue gains with a single factor sales formula, while production regions generally suffered revenue losses. Increased production eventually amplified the revenue gains for market regions and tempered revenue losses for production regions, but could over-take the static effect only in the extreme long-term, defined as a sufficient period of time for firms to cost-effectively reallocate all of their production and sales to minimize their nation-wide state corporate income tax burden. Of course, the impact picture was very different when all regions simultaneously moved to a single factor sales formula. Regions that suffered from an economic development standpoint under the simultaneous action case saw substantial dynamic revenue losses.

Corporate profits, and therefore corporate tax revenues, are notoriously difficult to forecast. Even if general economic forecasts were reliable, and they are not, a good estimate of corporate profits would remain more a result of luck than of methodology and effort. Nevertheless, there is a need for some sense of the revenue implications of major tax policy changes, and the move to a single-factor sales apportionment formula in Georgia certainly is a significant policy change. The main findings suggest that the single-factor sales formula is likely to stimulate economic development in the state, although only to a relatively moderate degree, and that the State of Georgia would likely see a revenue loss of $60.3 million in the first year of a single-factor sales formula regime. This decline would persist for several years, although decreasing in magnitude in
every succeeding year. The distribution of the Georgia corporate income tax burden would likely change substantially – there will be several big winners, but several big losers as well.

It is important to remember that we have not argued that corporate tax collections would actually decline in 2002 under a single-factor sales formula, but rather that corporate tax collections would be around $60 million less than what would likely be the case if the state were to maintain its current double-weighted sales formula. Secondly, to the extent that a single-factor sales formula generates additional employment and income, personal income tax collections and sales tax collections would likely offset part of the revenue loss. Finally, this policy change, while significant, is unlikely to be the driving force behind the time path of corporate tax collections in the future, but rather profits and the statutory tax rate will, as always, be the primary determinant.

Endnotes


Introduction

The State of Georgia, like all other U.S. states and the Canadian provinces, uses a formulary method to apportion the taxable income of multistate corporations, with the allocation of income to each state based on the relative distribution of the firm’s gross receipts (sales), employee compensation (payroll), and property in that state. States traditionally have given each of these three factors equal weight in the apportionment formula, but the trend in recent years has been to place a disproportionately heavy weight on the sales factor. This policy is intended to stimulate economic development in the state and to export part of the corporate tax burden to "out-of-state firms." Georgia pursued such a policy in 1995, when it switched from an equally weighted formula to a modified formula which places a double weight on the gross receipts factor relative to the payroll and property factors.1 In the 2000 legislative session, a bill was introduced to change the apportionment formula again, this time to a single-factor sales formula, which would apportion the taxable income of multistate corporations exclusively on the basis of Georgia's share of their national gross receipts.2 While the bill was never brought to a vote, it is expected to be considered in the upcoming 2001 legislative session.

The apportionment issue is a complex and often misunderstood issue. At the same time, it is an issue for which a great number of people, including corporations, the government of Georgia, and the citizens of the state, have a vested interest. Of course, the interests of these various groups are in many ways at odds with one another. Corporations would like to minimize their tax burden, and while the single-factor sales formula would reduce taxes for some, it would increase the tax burden for others. The government of Georgia, and the citizens they represent, have conflicts as well. The state must collect sufficient revenues, and it has decided that the income of corporations is a reasonable base upon which to levy these taxes.3 While the state

1Ga. L. 1995, p.714, §§ 1,2 codified at OCGA §§ 48-7-31, 48-7-141.
2HB 1408.
3This report takes the continued existence of a corporate income tax in the State of Georgia as a given. While there are several reasonable arguments for both retaining and eliminating the tax, a discussion of these arguments is beyond the scope of this report. Interested readers are encouraged to see Martin Grace, "Georgia's Company Taxes: Should the Corporate Income Tax Be Repealed?" Issue Analysis, Georgia Public Policy Foundation, 1998 [reprinted as Fiscal Research Program Report No. 13, Andrew Young School of Policy Studies, Georgia State University, April, 1998].
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desires to collect reasonable revenues in equitable and efficient manner, it also would like to do so in a way that promotes, or at least does not hinder, the development of the state economy. Because revenue concerns and development concerns often lead to very different policy solutions, they must be weighed and balanced with good information.

The purpose of this report is to provide objective, detailed information on the apportionment issue to elected officials, policy makers, corporations, and other interested parties in anticipation of the 2001 legislative session. The hope is that the analysis contained in this report will foster a reasonable, informed debate of the single-factor sales apportionment issue in the State of Georgia.

The report proceeds as follows. Section 2 describes the calculation of Georgia taxable income in the context of the formulary apportionment system, then proceeds to demonstrate how a modified formula changes business tax liabilities and incentives and to discuss the State of Georgia’s apportionment provisions relative to other U.S. states. Section 3 presents a formal revenue impact analysis, which is the primary focus of this report, followed by a brief conclusion in Section 4.

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Formulary Apportionment and Strategic Apportionment Policies

A. Calculation of Georgia Taxable Income via Formulary Apportionment

The calculation of Georgia taxable income begins with federal taxable income, to which a variety of additions and subtractions are applied to arrive at *net business income* (Table 1).\(^5\) “Net income allocated everywhere,” which essentially can be defined as the total of the firm’s national income that is not earned as a part of the regular course of business,\(^6\) is then subtracted from this amount to arrive at *net business income subject to apportionment*.\(^7\) It is to *net business income subject to apportionment* to which the apportionment formula is applied.

**Table 1. Computation of Georgia Taxable Income for Multistate Corporations**

<table>
<thead>
<tr>
<th></th>
<th><strong>Federal Taxable Income</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Additions to federal income</td>
</tr>
<tr>
<td>-</td>
<td>Subtractions from federal income</td>
</tr>
<tr>
<td>-</td>
<td><em>Net business income</em></td>
</tr>
<tr>
<td>-</td>
<td>Net income allocated everywhere</td>
</tr>
<tr>
<td>(\times)</td>
<td><em>Net business income subject to apportionment</em></td>
</tr>
<tr>
<td>(\times)</td>
<td>Georgia Ratio</td>
</tr>
<tr>
<td>+</td>
<td><em>Net business income apportioned to Georgia</em></td>
</tr>
<tr>
<td>-</td>
<td>Net income allocated to Georgia</td>
</tr>
<tr>
<td>-</td>
<td>Net operating loss apportioned to Georgia</td>
</tr>
<tr>
<td>=</td>
<td><strong>GEORGIA TAXABLE INCOME</strong></td>
</tr>
</tbody>
</table>

Source: *Official Code of Georgia* (OCGA) § 48-7-31; Department of Revenue, Income Tax Division, State of Georgia, Form 600.

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\(^5\)For details, see OCGA §48-7-27(b). See also Martin F. Grace and Jorge Martinez-Vazquez, *Georgia’s Company Taxes: A Report to the Joint Revenue Study Commission*, 1994.

\(^6\)Grace and Martinez-Vazquez, *op. cit.*

\(^7\)For details, see OCGA § 48-7-31(b)(2).
A Single Factor Sales Apportionment
Formula In the State of Georgia

Net business income apportioned to Georgia (NBI-GA) is calculated from net business income subject to apportionment (NBIA) in the following manner:8

\[
NBI - GA = \left[ w^s \left( \frac{Sales_{GA}}{Sales_{Total}} \right) + w^p \left( \frac{Property_{GA}}{Property_{Total}} \right) + w^r \left( \frac{Payroll_{GA}}{Payroll_{Total}} \right) \right] \text{NBIA}
\]

where the terms \( w^s \), \( w^p \), and \( w^r \) are Georgia’s weights on sales, property, and payroll factors, respectively, in its apportionment formula (currently \( \frac{1}{2}, \frac{1}{4}, \) and \( \frac{1}{4} \)). Finally, net income allocated to Georgia is added and net operating losses apportioned to Georgia are subtracted to arrive at Georgia taxable income. It is to this amount, if positive, that Georgia’s six percent corporate income tax rate is applied.

B. The Mechanics of Strategic Apportionment

The use of formulary apportionment renders an incidence pattern for state corporate income taxes that is in many ways very different from the standard incidence results for corporate income taxes – it is not a tax on accounting profits. A series of papers in the 1980s established that, to the extent tax rates vary across jurisdictions, formula-apportioned corporate income taxes are similar in their

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8OCA § 48-7-31(d). The formula given in (Eq. 2.1) does not apply to income derived from air transport, which is apportioned on the basis of revenue miles, tons handled, and originating revenue factors [OCA § 48-7-31(d)(3.1)]. Nor does this formula apply to income derived from “credit card processing and related services,” when more than 60 percent of gross receipts are derived from activity in Georgia. In this case, net business income apportioned to Georgia is determined on the basis of gross receipts only (a single-factor sales formula) [OCA § 48-7-31(d)(3.2)]. The are a couple of special consideration in the revenue code that deserve noting, as well. First, if a taxpayer believes that the apportionment provisions do not “fairly represent the extent of the taxpayers business activity in the state,” the taxpayer may then “petition the commissioner, or the commissioner may by regulation require” the employment of an alternative method to “effectuate an equitable allocation and apportionment of the taxpayer’s income” [OCA § 48-7-31(3)(E)]. Secondly, under certain conditions, newly locating or expanding corporations in the state may “enter into an agreement” with the commissioner to “[establish] the allocation and apportionment of the taxpayer’s income for a limited period” [OCA § 48-7-31(d)(1)]. For a more detailed (and critical) look at this provision, see Jessica L. Kerner, “Secret Agreements – Georgia Corporate Income Tax – Allocation and Apportionment,” State Tax Notes, June 19, 2000.
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incidence to a set of implicit excise taxes on the apportionment factors. That is, the economic effects mimic the effects of sales taxes, payroll taxes, and property taxes. It stands to reason that placing a relatively greater weight on the sales factor (with commensurate reductions in property and payroll factor weights) would diminish the implicit excise tax on productive factors and hence encourage business location or expansion. Moreover, firms with a large share of productive activity in the state relative to sales activity would see their tax liabilities diminish relative to sales-intensive firms, and hence corporate income taxes would in some sense be exported to out-of-state enterprises.

As a numerical example, consider a hypothetical multistate firm which produces and sells in three states (A, B, and C), with the distribution of its economic activities in those states given by the figures in Table 2.

Suppose initially that each state imposes an equally weighted three-factor formula \( w^S = w^P = w^R = 1/3 \). Given the apportionment formula described above (Sec. 2.1), 33.3 percent of the firm's taxable income will be allocated to state A,

### Table 2. Hypothetical Distribution of Activity Across States (% of Total)

<table>
<thead>
<tr>
<th>State</th>
<th>Sales</th>
<th>Property</th>
<th>Payroll</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.50</td>
<td>0.20</td>
<td>0.30</td>
</tr>
<tr>
<td>B</td>
<td>0.20</td>
<td>0.50</td>
<td>0.40</td>
</tr>
<tr>
<td>C</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
</tr>
</tbody>
</table>

36.7 percent will be allocated to state B, and 30.0 percent will be allocated to state C. Now suppose that state B switches to a double-weighted sales formula \( (i.e., \ w_B^S = 1/2; \ w_B^R = w_B^P = 1/4) \), as Georgia did in 1995. Using the distribution of economic activity described in Table 2.2, the proportion of the firm’s income taxable in state B would be reduced from 36.7 percent to 32.5 percent, which yields a 12.2 percent reduction in the firm’s state B tax liability.\(^{10}\) The reduction in tax liability arises because the state B share of the firm’s sales (20 percent) is relatively lower than the state B share of the firm’s production (45 percent).\(^{11}\) That is, because the firm is \textit{production-intensive} in state B, it receives a tax cut when state B moves to double-weighted sales.

Under a single-factor sales apportionment scheme \( (i.e., \ w_B^S = 1; \ w_B^R = w_B^P = 0) \), as is now under consideration in the State of Georgia, the proportion of the firm’s income taxable in state B would be reduced even further to 20 percent, which represents a 38.5 percent tax reduction from the double-weighted sales case, or a 45.9 percent reduction from the equally weighted formula case.\(^{12}\) Table 3 shows the allocation of the firm’s profits to all three states under the equally weighted three-factor, double-weighted sales, and single-factor sales formulas.

\(^{10}\)The allocation of the firm’s profits to state B under the double-weighted sales apportionment formula becomes: \( \text{Share}_B = (1/2)(0.20) + (1/4)(0.50) + (1/4)(0.40) = 0.325 \), which is a reduction of 12.2 percent from the equally weighted formula case (0.367).

\(^{11}\)Based on an equal weight being given to property and payroll in the apportionment formula, which currently is the case in every state with a three-factor apportionment formula \( [0.45 = (1/2)(0.50) + (1/2)(0.40)] \).

\(^{12}\)The allocation of the firm’s profits to state B under the single-factor sales apportionment formula becomes: \( \text{Share}_B = (1)(0.20) + (0)(0.50) + (0)(0.40) = 0.20 \), which is a reduction of 38.5 percent from the double-weighted sales formula case (0.325) and a 45.9 percent reduction from the equally weighted formula case (0.37). Assuming that states A and C do not change their formulas, the firm’s nation-wide (total) income will now be under-apportioned by the formulary apportionment system. With a double-weighted sales formula in state B, 4.5 percent of the firm’s income will be untaxed by any state, while under a single-factor sales formula in state B, 17.0 percent of the firm’s total income will go untaxed (in the double-weighted sales case, the total apportionment will be 0.33 + 0.325 + 0.30 = 0.955; under the single-factor sales formula case, the total apportionment will be 0.33 + 0.20 + 0.30 = 0.83). For more on the under- and over-apportionment issue, see Salvador Lopez, \textit{Do States Over or Under Apportion Corporate Income: An Evaluation of the Formula Apportionment System}, Ph.D. dissertation, Andrew Young School of Policy Studies, Georgia State University, 1996. See also Salvador Lopez and Jorge Martinez, “An Evaluation of the Formulary Apportionment System,” \textit{State Tax Notes}, January 12, 1998.
A Single Factor Sales Apportionment Formula In the State of Georgia

Table 3. Allocation of Hypothetical Firm’s Taxable Income Across States Under Three Apportionment Regimes

<table>
<thead>
<tr>
<th>State</th>
<th>Equally Weighted</th>
<th>Double-Weighted Sales</th>
<th>Single-Factor Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.333</td>
<td>0.375</td>
<td>0.500</td>
</tr>
<tr>
<td>B</td>
<td>0.367</td>
<td>0.325</td>
<td>0.200</td>
</tr>
<tr>
<td>C</td>
<td>0.300</td>
<td>0.300</td>
<td>0.300</td>
</tr>
</tbody>
</table>

Although the firm’s state B tax liability is reduced with a disproportionately heavy sales factor weight, it is not the tax reduction *per se* that encourages the firm to locate production in state B. Moreover, the firm would also be encouraged to locate additional productive activity in states A and C if those states were to impose double-weighted sales or single-factor sales policies, even though the firm’s tax liability would increase in state A and remain the same in state C under the new policy regimes.\(^{13}\)

As noted above, to the extent that tax rates differ across states, the formula-apportioned corporate income mimics the effects of excise taxes on the apportionment factors. From an economic development perspective, it is the tax differentials that matter, not the level of tax rates and factor weights. These differentials, which represent the implicit excise taxes on apportionment factors, are altered when apportionment formula factor weights are changed, and it is this effect that encourages firm location or expansion, not the change in overall tax liability. Thus, all firms are encouraged to locate additional productive activity (property and payroll) when states place a heavier weight on the sales factor, regardless of the contemporaneous change in their tax liability. This incentive is amplified by the fact

\(^{13}\)This is a point that is often missed in the formal economics and accounting literature, much less in the state legislatures and courts, and deserves some rather detailed explanation. However surprising the result may seem on the surface, the result is actually rather intuitive and can be formally verified with some complicated algebra. Given the nature of this report, the technical details are left for an appendix. The reader is also encouraged to review Kelly D. Edmiston, “Strategic Apportionment of the State Corporate Income Tax,” working paper, Andrew Young School of Policy Studies, Georgia State University, April, 2000.
that a heavier sales factor weight in one state actually increases the tax differentials on property and payroll, and hence the implicit property and payroll taxes, in other states. At the same time, heavier sales factor weights discourage in-state sales because the implicit sales tax rendered by formulary apportionment is increased.

Table 4 shows the implicit tax rates on apportionment factors for our hypothetical example in all three states under a single-factor sales apportionment formula, assuming that other states retain an equally weighted three-factor formula. In an effort to ease the exposition, all states are assumed to levy the same statutory rate, and thus the tax differentials are zero when all states impose an equally weighted three-factor formula.

**TABLE 4. TAX DIFFERENTIALS WITH SINGLE-FACTOR SALES FORMULAS (%) BY STATE**

<table>
<thead>
<tr>
<th>Imposing State</th>
<th>Factor/State</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Sales</td>
<td>+3.3</td>
<td>-3.3</td>
<td>-3.3</td>
</tr>
<tr>
<td></td>
<td>Payroll</td>
<td>-2.7</td>
<td>+0.7</td>
<td>+0.7</td>
</tr>
<tr>
<td></td>
<td>Property</td>
<td>-2.3</td>
<td>+1.0</td>
<td>+1.0</td>
</tr>
<tr>
<td>B</td>
<td>Sales</td>
<td>-1.3</td>
<td>+5.3</td>
<td>-1.3</td>
</tr>
<tr>
<td></td>
<td>Payroll</td>
<td>+1.7</td>
<td>-1.7</td>
<td>+1.7</td>
</tr>
<tr>
<td></td>
<td>Property</td>
<td>+1.3</td>
<td>-2.0</td>
<td>+1.3</td>
</tr>
<tr>
<td>C</td>
<td>Sales</td>
<td>-2.0</td>
<td>-2.0</td>
<td>+4.7</td>
</tr>
<tr>
<td></td>
<td>Payroll</td>
<td>+1.0</td>
<td>+1.0</td>
<td>-2.3</td>
</tr>
<tr>
<td></td>
<td>Property</td>
<td>+1.0</td>
<td>+1.0</td>
<td>-2.3</td>
</tr>
</tbody>
</table>

Again, the reader is referred to the report’s technical appendix for a derivation and more detailed explanation. The magnitude of the differentials is somewhat over-stated by a simplification in the calculation; however, the results would be identical in qualitative terms and relative magnitude if the simplification had not been made. With an identical statutory rate, the differentials are zero when all states impose an identical formula, regardless of what that formula is. See the technical appendix to this report for additional details on these calculations.
As the table demonstrates, the imposition of a single-factor sales formula in state B (when states A and C retain their equally weighted formula) has the effect of imposing a 5.3 percent sales tax, a 1.7 percent payroll subsidy, and a 2.0 percent property subsidy on the firm. Moreover, it also has the effect of imposing taxes on payroll and property in states A and C (at rates of 1.7 percent and 1.3 percent, respectively) and subsidizing sales in those states (at a rate of 1.3 percent). In essence, state B’s single-factor sales apportionment policy makes locating payroll and property less costly in that state relative to other states, and more costly in other states relative to state B. Note also that a similar policy imposed independently by states A and C would have a similar incentive effect on this hypothetical firm, even though its tax liability would be either increased (A) or unaltered (C) in those states. On the margin, the firm has an incentive to locate additional payroll and property in state A under a single-factor sales scheme, although its overall tax liability has been increased significantly, because its now higher tax burden would be reduced by this effort.

C. Empirical Evaluation of Strategic Apportionment Policies

Despite the interest in strategic modification of apportionment formulas in state legislatures, the issue was largely ignored by the economics profession until very recently. Over the last few years, however, a series of papers has surfaced to expand the state of knowledge on this issue considerably.

Using cross-sectional data in a 1994 study, Joann Weiner of the U.S. Treasury Department found no relationship between the choice of apportionment formula and investment, but did find some weak evidence of a link in a later study, which used first-differences to control for fixed effects. Using panel data over the period 1978-1994, Austan Goolsbee and Edward Maydew provided stronger evidence that heavier

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16 Of course, these taxes (subsidies) are not actually collected (distributed) and in that sense are “implicit.” One state’s policy effects the corporate income tax cost of using productive factors and making sales in all states, and the impact of those effects are identical to the effects that would arise if state B could in fact levy taxes and subsidies in other states.

sales factor weights can have a positive economic development impact, suggesting that a move from an equally weighted three-factor formula to a double-weighted sales formula increases manufacturing employment by 1.1 percent on average. Finally, Kenneth Klassen and Douglas Shackelford provided evidence that companies structure their shipments to reduce sales in states that place a relatively high assessment on gross receipts through their apportionment formulas.

In a different approach, Edmiston used an eight-region applied general equilibrium model to simulate the effects of heavier sales factor weights on economic development and corporate tax revenues. He found that while heavier sales factor weights may have a significantly positive impact on economic development in the very long run, the short run effects are negligible. Moreover, he found that the economic development impact can vary substantially across states depending on the industrial structure and other characteristics of the state.

While there is still no consensus on the magnitudes of the effects, these findings do suggest that strategic apportionment policies are likely to be stimulative, although probably not by a tremendous degree, especially in the short run.

D. Strategic Apportionment Across the States: Where Does Georgia Stand?

Given the potential for economic development gains and significant tax exporting, it is not surprising that more and more states, including Georgia, have been amending their formulas to place a disproportionately heavy weight on the sales

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21 In this case, the long-run is defined as a period of time sufficient for capital and labor to be considered completely mobile, and for existing firms to plan adequately for relocation at a minimum cost. In the (very) long run, the economic development impact, which is defined as the percentage change in corporate capital stocks relative to what they would have been in the absence of a single factor sales formula, is estimated to be between
factor. Of the 48 states (including the District of Columbia) that impose corporate income taxes, 32 currently place a disproportionately heavy weight on the sales factor (Table 5).\textsuperscript{22} A large majority of these states made the switch from an equally-weighted three factor formula in the 1990s, which underscores the increasingly competitive nature of both corporate income taxation policies and economic development policy more generally.

For the most part (Iowa is an exception), states have traditionally imposed a double-weighted sales formula when departing from an equally-weighted scheme; however, in recent years states have become more aggressive and increasingly have been modifying apportionment formulas to put an even greater weight on the sales factor. Nine states currently place greater than one-half weight on the sales factor, ranging from 60 percent in Ohio (triple-weighted sales) to a single-factor sales formula (100 percent weight on sales) in Iowa, Nebraska, and Texas. Illinois currently is phasing in a single-factor sales formula, which will come into play in January, 2001. Many other states that offer optional formulas with greater sales factor weights, including single-sales factor formulas.

Despite the competitiveness of apportionment policy across the states, the Southeastern states generally have not been as aggressive. None of the states adjacent to Georgia impose apportionment formulas with a sales factor weight greater than in Georgia (most also have double-weighted sales); nor do other Southeastern states, save for South Carolina and Mississippi, where optional formulas are pervasive.

\textsuperscript{22}Currently 32 of the 47 states (including District of Columbia) that impose corporate income taxes place a disproportionately heavy weight on the sales factor. Of the remainder, four states offer either optional formulas with greater sales factor weights or offer these formulas to specified industries. While most states employ a double-weighted sales formula (half weight for sales and quarter weights for payroll and property), states increasingly have become more aggressive, with some states employing single-factor sales formulas (100 percent weight on sales). See Federation of Tax Administrators, “State Apportionment of Corporate Income.”
# A Single Factor Sales Apportionment Formula in the State of Georgia

## TABLE 5. CORPORATE INCOME APPORTIONMENT FORMULAS ACROSS THE UNITED STATES AS OF JANUARY, 2000

<table>
<thead>
<tr>
<th>State</th>
<th>S</th>
<th>Py</th>
<th>Pr</th>
<th>Comment</th>
<th>State</th>
<th>S</th>
<th>Py</th>
<th>Pr</th>
<th>Comment</th>
</tr>
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<td>1/3</td>
<td>1/3</td>
<td></td>
<td>Montana</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td></td>
</tr>
<tr>
<td>Alaska</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td></td>
<td>Nebraska</td>
<td>1</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Arizona</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td></td>
<td>Nevada</td>
<td>No Corporate Income Tax</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arkansas</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td></td>
<td>New Hampshire</td>
<td>3/7</td>
<td>2/7</td>
<td>2/7</td>
<td></td>
</tr>
<tr>
<td>California</td>
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<td>1/4</td>
<td>1/4</td>
<td></td>
<td>New Jersey</td>
<td>1/4</td>
<td>1/4</td>
<td>1/4</td>
<td></td>
</tr>
<tr>
<td>Colorado</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td>Optional 2-factor sales and property</td>
<td>New Mexico</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td></td>
</tr>
<tr>
<td>Connecticut</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td>Nonmanufacturing is single-factor sales</td>
<td>New York</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td>Only manufacturers may use double-weighted sales</td>
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<tr>
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<td>1/3</td>
<td>1/3</td>
<td></td>
<td>North Carolina</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
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</tr>
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<td>Washington, DC</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td></td>
<td>North Dakota</td>
<td>1/3</td>
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</tr>
<tr>
<td>Florida</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
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<td>Ohio</td>
<td>3/5</td>
<td>1/5</td>
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<tr>
<td>Georgia</td>
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<td>1/4</td>
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<td>Oklahoma</td>
<td>1/3</td>
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<tr>
<td>Hawaii</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td>Other options available</td>
<td>Oregon</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td></td>
</tr>
<tr>
<td>Idaho</td>
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<td>1/4</td>
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<td>3/5</td>
<td>1/5</td>
<td>1/5</td>
<td></td>
</tr>
<tr>
<td>Illinois</td>
<td>1/12</td>
<td>1/12</td>
<td>5/6</td>
<td>Single-factor sales beginning 2001</td>
<td>Rhode Island</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td></td>
</tr>
<tr>
<td>Indiana</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td></td>
<td>South Carolina</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td>Applies only to manufacturers and dealers in tangible personal property – others single-factor sales</td>
</tr>
<tr>
<td>Iowa</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
<td>South Dakota</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td></td>
</tr>
<tr>
<td>Kansas</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td>Optional property and sales for qualified firms</td>
<td>Tennessee</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td></td>
</tr>
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<td>1/4</td>
<td>1/4</td>
<td>Service firms property and income</td>
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<td>1/3</td>
<td>1/3</td>
<td></td>
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<td>Maine</td>
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<td>1/4</td>
<td>1/4</td>
<td></td>
<td>Vermont</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td></td>
</tr>
<tr>
<td>Maryland</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td></td>
<td>Virginia</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td>Single-factor sales for certain industries</td>
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<td>1/4</td>
<td>1/4</td>
<td>90-5-5 for manufacturers</td>
<td>Washington</td>
<td>No Corporate Income Tax</td>
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<td>Michigan</td>
<td>1/20</td>
<td>1/20</td>
<td>9/10</td>
<td>Modified VAT</td>
<td>West Virginia</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td></td>
</tr>
<tr>
<td>Minnesota</td>
<td>3/20</td>
<td>3/20</td>
<td>7/10</td>
<td>34/8-1/8 beginning 2001</td>
<td>Wisconsin</td>
<td>1/2</td>
<td>1/4</td>
<td>1/4</td>
<td></td>
</tr>
<tr>
<td>Mississippi</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td>Manufacturers selling at retail double weighted; retail and service single-factor sales</td>
<td>Wyoming</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missouri</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td>Optional single-factor sales</td>
<td></td>
<td></td>
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A Single Factor Sales Formula in Georgia: Likely Revenue Effects

Several factors are critical in determining the direction and magnitude of revenue changes under a strategic apportionment scheme. To explore these factors, we first note that total corporate tax collections in the state is given by

\[ T = \tau \sum_i \phi_i \pi_i, \]

where \( \phi_i \) is the percentage of firm \( i \)'s profits apportioned (by formula) to Georgia, \( \pi_i \) is firm \( i \) net income subject to apportionment in Georgia, \( \tau \) is the statutory corporate income tax rate in the state, currently six percent, and \( \Sigma \) indicates summation across all firms.\(^{23}\) The change in Georgia's corporate tax collections from a given change in its sales factor weight (\( \Delta T \)) is then given by:

\[ \Delta T = \tau \left( \sum_i [\pi_i \Delta \phi_i + \phi_i \Delta \pi_i] \right) \Delta w^S \]

where a superscore represents initial value.\(^{24}\) For any given change in the sales factor weight, the revenue gains and losses arising from the \( \Delta \pi_i \) terms are shared across states according to their \( \phi_i \)'s, and there is little reason or evidence to suggest that this effect in any one state would be large.\(^{25}\) We must therefore look to the \( \Delta \phi_i \) term as the major source of revenue impacts with an increased sales factor weight, which represents the revenue implications that arise because the formula itself has changed.

There are several ways in which strategic apportionment may affect Georgia's \( \phi_i \)'s. First, if Georgia is a "market region" rather than a "production region," that is,

\[ \sum_i \pi_i \left[ \frac{Sales_{GA}}{Sales_{Total}} \right] - \frac{1}{2} \left( \frac{Property_{GA}}{Property_{Total}} + \frac{Payroll_{GA}}{Payroll_{Total}} \right) > 0 \]

\(^{23}\)Recall from section 2.1 that the apportionment percentage is given by:

\[ \phi = w^S \left( Sales_{GA} / Sales_{Total} \right) + w^P \left( Property_{GA} / Property_{Total} \right) + w^P \left( Payroll_{GA} / Payroll_{Total} \right). \]

\(^{24}\)By law the factor weights must sum to one, and traditionally, states have lowered payroll and property factor weights proportionately with an increase in the sales factor weight, implying that \( \Delta w^P = \Delta w^S = -(1/2) \Delta w^S \).

\(^{25}\)See Edmiston, 1998b, *op cit.*
then placing a heavier weight on the sales factor will lead to greater revenues, all else equal. Because this factor ignores policy-induced shifts in sales and production, we can think of the sales/production intensity factor as the “static,” or immediate revenue effect.

Second, to the extent that placing a greater weight on the sales factor drives away sales in the state, corporate tax revenues will be diminished because a reduction in Georgia’s share of total sales implies a reduction in its apportionment percentage, all else equal. Similarly, to the extent that a heavier sales factor weight encourages an inflow of production activity, revenues will be enhanced through increases in Georgia’s share of total firm property and/or payroll. We can think of these revenue impacts as “dynamic,” or longer-term effects.

In Edmiston’s 1998(a,b) and 2000 multi-region applied general equilibrium studies of this issue, both the short-run and long-run versions of the simulation models suggested that the immediate or static revenue effect was the strongly dominant effect. That is, market regions, as defined above, saw revenue gains with a single factor sales formula, while production regions generally suffered revenue losses. Increased production eventually amplified the revenue gains for market regions and tempered revenue losses for production regions, but could over-take the static effect only in the extreme long-term, defined as a sufficient period of time for firms to cost-effectively reallocate all of their production and sales to minimize their nation-wide state corporate income tax burden. Of course, the impact picture was very different when all regions simultaneously moved to a single factor sales formula. Regions that suffered from an economic development standpoint under the simultaneous action case saw substantial dynamic revenue losses.

Corporate profits, and therefore corporate tax revenues, are notoriously difficult to forecast. Even if general economic forecasts were reliable, and they are not, a good estimate of corporate profits would remain more a result of luck than of methodology and effort. Nevertheless, there is a need for some sense of the revenue implications of major tax policy changes, and the move to a single-factor sales apportionment formula in Georgia certainly is a significant policy change. In the remainder of this section we undertake an estimate of the revenue implications of a single-factor sales apportionment formula in the State of Georgia. We begin with a
static estimate, which compares actual 1998 corporate tax collections with what would have been collected if Georgia had a single-factor sales formula in that year, assuming no behavioral (dynamic) responses on the part of firms. This static estimate should be pretty well on target save for any errors in the tax returns used to construct the estimate, and we are relatively confident in the results. We then attempt to evaluate the likely behavioral responses of firms to compute a relatively short-term dynamic estimate, but the reader should keep in mind that the dynamic estimate is necessarily an educated guess in some sense.

A. A Static Revenue Estimate of a Single-Factor Sales Apportionment Formula

The methodology used to estimate the likely static revenue impact of a single-factor sales apportionment formula in Georgia compares actual 1998 corporate tax collections with what would have been collected if Georgia had a single-factor sales formula in that year. Again, in the static estimate we assume no behavioral responses on the part of firms. That is, we assume that the sales, payroll, and property factors would be unchanged. This assumption is entirely reasonable in the short-run (especially in one-to-two-year time horizon) because firms cannot be expected to make substantial changes in location. Even in the medium-term and relatively near long-term this static effect is expected to dominate any dynamic effects that arise from changes in firm location or tax planning strategies.

To construct the estimate, all Georgia corporate tax returns from the most recent year for which the data is available (1998) were tabulated, and the tax liability of each firm was recalculated under the proposed single-factor sales formula. The difference between the recalculated tax liabilities and the realized tax liabilities, in the aggregate, then provided the static revenue impact estimate.

If a single-factor sales formula was put into effect in tax year 1998, assuming that firms did not make significant changes in the location of their business activities, tax collections would have been reduced by $57.3 million, or 7.7 percent. The static revenue estimate for 1998 corporate tax returns suggests that the imposition of a single-factor sales formula in the State of Georgia in 2002 would likely yield a corporate tax revenue loss of approximately $61.6 million in its first year. This figure is based on 2000 revenue collections of $737.8 million, adjusted upward to tax
A Single Factor Sales Apportionment
Formula In the State of Georgia

year 2002 by a 4.1 percent linear compound annual growth trend (Figure 1), giving a rough estimate of $799.5 million for 2002 under a double-weighted sales scheme.\(^{26}\) A reduction of 7.7 percent then yields our 2002 single-factor sales revenue estimate of $737.9 million.

Although this amount represents a one time “loss,” the reduction will persist into the future. To illustrate, Figure 2 shows the pattern of actual revenue collections between 1992 and 1997 in Georgia and a static estimate of the collections that would have been garnered had Georgia maintained an equally weighted formula. Of course, the two series are identical until tax year 1995, when Georgia switched to a double-weighted sales formula.

Often the distribution of these revenue changes is as important as the aggregate change, perhaps more important. A look at the distribution of tax burden changes using the 1998 returns gives insight into the pattern of tax burden changes we might expect if a single-factor sales formula were to be imposed for the 2002 tax year.

Of course, the revenue loss does not mean that all firms would have enjoyed a reduced tax burden, as there are clear winners and losers. Nor would the winners (losers) share the benefit (burden) equally, even as a percentage of their taxable income. Figure 3 provides a frequency distribution of winners and losers over various ranges of policy induced tax reduction or increases. Most striking is that 36 corporations would enjoy tax reductions of more than $500 thousand, five of which would see tax cuts of more than $2 million. On the other end of the distribution, 22 firms would have seen their tax liabilities increase by $250 thousand or more. Despite the relatively large numbers, few firms would have actually been affected by the change in policy. Of all firms with a corporate income tax liability over $1,000 under a double-weighted sales formula, almost 75 percent (mostly local firms) would have seen no change in their tax liability with a move to single-factor sales formula in 1998 (Figure 4). Several firms would have seen very substantial tax reductions or increases, however. Roughly 2.3 percent of all firms would have seen their corporate income tax liability eradicated entirely, while approximately 1.2 percent would have seen their tax liability increase by 100 percent or more. At the extremes, the biggest

\(^{26}\)$799.5 = $737.8(1.041)^2.$
FIGURE 1. GEORGIA CORPORATE INCOME TAX COLLECTIONS, 1970-2000 (INFLATION ADJUSTED)

FIGURE 2. TAX COLLECTIONS FROM MULTISTATE CORPORATIONS (ACTUAL VS. EQUALLY-WEIGHTED FORMULA REGIMES)
Figure 3. Distribution of Static Tax Liability Changes Under a Single Factor Sales Formula (1998)

Total Change = - $57.3M (7.7%)
Figure 4. Distribution of Static Tax Liability Percent Changes Under a Single Factor Sales Formula (1998) for Firms with Double-Weighted Tax Liability > $1,000

Total Change = -7.7%
A Single Factor Sales Apportionment Formula In the State of Georgia

tax cut would have been approximately $5.9 million (74.0 percent reduction), or roughly 10.3 percent of the total revenue loss, while one firm would have seen a substantial tax increase of approximately $2.4 million (90.4 percent increase). Most firms would have seen changes in their tax liabilities of much smaller magnitude, ± $5,000. The average firm would enjoy a $1,885 tax reduction (6.7 percent decrease), and roughly two-thirds of firms would fall in the range of − $62,782 and + $59,012.  

B. Static Revenue Estimates of Alternative Apportionment Formulas

A revenue loss of $61.5 million is quite substantial, and the Governor, legislature, and business community may or may not find the cost worthwhile. Nevertheless, policy makers should keep in mind that the apportionment issue is not necessarily an all or nothing proposition, as there are several alternatives to the equally weighted formula and double-weighted sales formula in current use. In addition to examining the revenue consequences of a single-factor sales formula for the state, we also evaluated three alternative and slightly less aggressive apportionment formulas. From most to least aggressive, we refer to these formulas as the Michigan, Illinois, and Minnesota formulas after the states currently imposing them. Table 6 provides basic statistics for the 1998 static revenue estimates across firms under all four scenarios.

The Michigan formula, which is actually applied to a modified value-added tax rather than a standard corporate income tax, places a 90 percent weight on the sales factor and 5 percent weights on the payroll and property factors. Again using 1998 tax returns to compile a static revenue estimate, the Michigan formula would yield a $43.2 million (5.8 percent) reduction in 1998 corporate tax collections, or roughly $46.4 million reduction for 2002. 

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27 This range is constructed on the basis of a standard deviation of $60,897, as calculated using the 1998 tax returns.
28 The distribution of changes in tax burden for these alternative formulas are presented in Appendix A: Supplemental Charts.
A Single Factor Sales Apportionment Formula In the State of Georgia


<table>
<thead>
<tr>
<th>Statistic</th>
<th>Apportionment Formula (Percent Sales, Percent Payroll, Percent Property)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minnesota (70, 10, 10)</td>
</tr>
<tr>
<td>Total</td>
<td>-$22.0m (3.0%)</td>
</tr>
<tr>
<td>Mean</td>
<td>-722</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>23,586</td>
</tr>
<tr>
<td>Minimum</td>
<td>-2,351,301</td>
</tr>
<tr>
<td>Maximum</td>
<td>959,385</td>
</tr>
</tbody>
</table>

The Illinois formula places an 83 1/3 percent weight on the sales factor and 8 1/3 percent weights on the payroll and property factors. Static revenue loss estimates for 1998 and 2002 under the Illinois scheme are $36.2 million (4.9 percent) and $39.2 million, respectively.

Finally, the Minnesota formula places a 70 percent weight on the sales factor and 15 percent weights on the payroll and property factors. Static revenue loss estimates under the Minnesota scheme are 22.0 million (3.0 percent) for 1998 and $24.0 for 2002.

### C. A Flavor for Behavioral Responses and Dynamic Effects

As indicated in Figure 1 above, corporate tax collections in Georgia, as in every other state, are quite volatile.\(^{29}\) Given this volatility, the dynamic effects of policy changes are especially difficult to gauge because it is nearly impossible to properly identify and isolate the sources of variation. Nevertheless, in this section we attempt to judge the likely dynamic effects of a single factor sales formula in spite of these hurdles by examining the dynamics of corporate tax collections before and after the switch to a double-weighted sales formula in 1995.

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To begin we note that the change in tax liability for some firm in year $t$ from the preceding year $t-1$ can be written as

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

where $\Delta$ indicates an annual change, $T_t$ is the firm’s tax liability in year $t$, $\phi_t$ is the share of the firm’s apportionable income \textit{apportioned by formula} to Georgia, and $\alpha_t$ is the amount of income \textit{allocated} to Georgia in year $t$. With a little algebraic manipulation, we may then rewrite the change in the firm’s tax liability in year $t$ as:

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

where $\phi_t^E$ is the apportionment of the firm’s taxable income under an equally weighted formula in year $t$. We can then decompose this expression into three components: [A] the amount due to changes in the apportionment percentage; [B] the amount due to changes in apportionable income; and [C] the amount due to changes in income allocable to Georgia.

Of course, our primary interest is in expression [A], the effects of changes in the apportionment formula, which can be further decomposed into what we might refer to as “Technical-Apportionment,” which is the static effect discussed in section 3.1 of the report, and “Location of Factors,” which represents the change in tax liability that arises because a firm produced and sold more or less in Georgia in year $t$ than in year $t-1$, a dynamic effect.

The “Technical-Apportionment” effect is given by the sum of expressions [1] and [3]. In years prior to 1995 both expressions will be zero because Georgia imposed an equally weighted formula. Because Georgia is a “market state,” as defined in this report, we know that in 1995 expression [1] will be negative, but expression [3] will remain zero. Finally, in years 1996 and beyond, expression [1] will continue to be negative, and because it is more or less a reversal of the previous period’s expression [1], we expect expression [3] to be positive, and thus the overall

\[30\] This is accomplished by adding and subtracting $\phi_{t-1} \pi_t$, $\phi_t^E \pi_t$, and $\phi_{t-1}^E \pi_t$ to the equation above, which is equivalent to adding 0.
technical-apportionment effect will tend toward zero in magnitude. It is in this sense (of assessing changes in tax collections) that the static revenue loss is a one-time affair.

The “Location of Factors” effect, given by expression [2], is the dynamic effect we seek to investigate in this section of the report. Essentially the questions asks “if Georgia had maintained an equally weighted formula, but firms behaved as they did under the double-weighted formula with regard to the location of sales, payroll, and property, how much would Georgia tax collections have changed?” To the extent that firms responded to the incentives offered by the double-weighted sales formula by locating additional payroll and property in the state (relative to the nation as a whole), we would expect the location-of-factors effect to be positive. Likewise, to the extent that firms are discouraged from making sales in the state following the imposition of a double-weighted sales formula, we would expect the location-of-factors effect to be negative. Of course firms may change the allocation of their sales, payroll and property across states for many reasons other than legislative changes in formulary apportionment policy, and thus the location-of-factors effect is nonzero both before and after 1995.

Figure 5 decomposes aggregate changes in Georgia taxable income for multistate corporations over the period 1992 – 1997. Again, aggregate levels of taxable income show a substantial degree of volatility, especially in terms of levels of apportionable and allocable income, which is of course directly related to the highly cyclical profitability of individual firms.

The technical-apportionment effect shows the pattern we would expect in examining changes in taxable income over time. There is a relatively large negative effect in the initial year of $358.2 million, which amounts to a revenue decrease of $21.5 million, but the effect gradually tapers off in the succeeding two years. Of course, the reader should keep in mind that we are evaluating changes in taxable

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31The static effect would be expected to be substantially larger in the case of moving from a double-weighted sales formula to a single-factor sales formula than in the case of moving from an equally weighted formula to a double-weighted sales formula. The former represents a 100 percent increase in the sales factor, while in the latter the increase is only 50 percent.
Figure 5. Annual Changes in Georgia Taxable Income (Multistate Corporations)
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income rather than levels of taxable income. Most of the initial $21.5 million reduction in levels persists through 1998 and beyond, as illustrated in Figure 2 above. The location-of-factors effect shows a surprising amount of variation over the relatively short time frame of this analysis, and at first glance, the effects suggest that firms responded vigorously to the double-weighted sales incentives by locating additional productive activity in the state. In 1995 and 1996, the first two years of the double-weighted sales formula, the location-of-factors effect yielded increases in Georgia taxable income of $439.8 million and $481.1 million respectively, which added $26.4 million and $28.9 million to Georgia’s corporate tax coffers in those two years. The pertinent question is whether or not the double-weighted sales policy was responsible for these substantial shift.

Our first clue is provided to us by the results from 1997, the third year of the double-weighted sales formula regime, which saw a substantial decrease in Georgia taxable income of $496.2 million, yielding a $29.8 million revenue loss. The volatility suggests that perhaps the double-weighted sales policy was not responsible for the large positive location-of-factors effects enjoyed in 1995 and 1996.

In an effort to examine the issue more carefully, we extended the analysis to an investigation of the distribution of sales, payroll, and property within and outside of Georgia by multistate firms filing corporate tax returns. Figure 6 shows aggregate levels of sales payroll and property by multistate corporations over the period 1992-1997, adjusted for inflation. Clearly there is a bump in the payroll and property factors, which suggests a responsiveness to double-weighted sales incentives, but there is also a substantial bump in Georgia gross receipts in 1995, which would not have been expected in the face of higher sales factor weights. Moreover, the increases in Georgia sales, payroll, and property in 1995 do not seem sufficiently large to explain the large location-of factors effect.

Of course, it is not the absolute levels of sales, payroll, and property in the state that determine the apportionment percentage, but rather these levels relative to the firms sales, payroll, and property nation-wide. Figure 7 shows aggregate sales, payroll, and property nationally of multistate corporations filing Georgia tax returns,
Figure 6. Sales, Payroll, and Property in Georgia (Inflation Adjusted, 1992-1997)
Figure 7. National Sales, Payroll, and Property of Georgia Firms (Inflation Adjusted, 1992-1997)
adjusted for inflation, over the same period. Nationally these firms appear to have added considerably to their sales and productive factors in 1994, the year preceding the adoption of a double-weighted sales factor in Georgia, but these levels dropped off considerably in 1995 and 1996. That means the denominators in the apportionment factors shrunk substantially for those years, while the numerators, or Georgia levels, increased slightly. This analysis suggests that while the location-of-factors effects were large and positive in 1995 and 1996, the cause was largely decreases in national levels of sales, payroll, and property rather than increases in Georgia levels.

Based on this evidence, and the empirical evidence provided by Edmiston, Goolsbee and Maydew, Weiner, and Klassen and Shackelford, we would expect to see little in the way of dynamic revenue effects with a single-factor sales formula during the initial period of adoption, and suggest that the static effect would continue to dominate in the medium term, implying lower revenues for several years. In fact, in one 1998 simulation study, Edmiston suggested that these dynamic effects would amount to approximately -2 percent of the static revenue impact, or approximately $1.2 million in corporate tax collections, yielding a final first year (2002) loss estimate of $60.3 million. Eventually, in the longer term, these dynamic effects would become larger in magnitude than the static effects, but several years would likely elapse before that became the case.
Conclusion

This report presents a conceptual view of how a single-factor sales formula would provide economic incentives to existing or newly locating firms, a summary review of the existing empirical literature examining the effectiveness of these incentives, and a detailed analysis of the likely revenue consequences. The main findings suggest that the single-factor sales formula is likely to stimulate economic development in the state, although only to a relatively moderate degree, and that the State of Georgia would likely see a revenue loss of 7.5 percent if its corporate income tax, or $60.3 million in the first year of a single-factor sales formula regime. This decline would persist for several years, although decreasing in magnitude in every succeeding year. The distribution of the Georgia corporate income tax burden would likely change substantially – there will be several big winners, but several big losers as well.

Several other important revenue aspects of the single-factor sales formula must also be considered. First, we have not argued that corporate tax collections would actually decline in 2002 under a single-factor sales formula, but rather that corporate tax collections would be around $60 million less than what would likely be the case if the state were to maintain its current double-weighted sales formula. Secondly, to the extent that a single-factor sales formula generates additional employment and income, personal income tax collections and sales tax collections would likely offset part of the revenue loss. Finally, this policy change, while significant, is unlikely to be the driving force behind the time path of corporate tax collections in the future, but rather profits and the statutory tax rate will, as always, be the primary determinant.
Appendix A. Supplemental Charts
Figure A.1: Distribution of Static Tax Liability Changes Under Illinois Formula (1998)

Total Change = $43.2M (53.8%)

Number of Million Dollars

Range
Figure A.3. Distribution of Static Tax Liability Changes Under A Minnesota Formula (1998)

Total Change = - $22.0M (3.0%)
Appendix B. Technical Appendix: The Analysis of Strategic Apportionment Policy Impacts.

T.1. Tax Differentials: A Framework for Analysis

In an effort to examine the multitude of issues involved in formulary apportionment in a reasonably concise but comprehensive way, it is necessary to establish a consistent framework for the analysis. This section outlines such a framework where the tax differentials arising from formulary apportionment are used to examine the implications of various details in formula apportionment policy.

Consider a multistate firm with objective function

(Eq. T.1.1) \[ \pi = (S - P) \left[ 1 - \sum_j t_j \phi_j \right] - R \]

where states are indexed by \( j \); \( S = q \sum_j F(K_j, L_j) \), \( P = w \sum_j L_j \), and \( R = r \sum_j K_j \) are the firm’s sales, payroll, and property nationally, where \( F(\bullet) \) is the production function and \( r \), \( w \), and \( q \) are market prices for capital \( (K) \), labor \( (L) \), and output, respectively; \( t_j \) is the statutory corporate tax rate in state \( j \), and \( \phi_j \) is the apportionment of the firm’s taxable profits (defined as \( S - P \)) to state \( j \):

(Eq. T.1.2) \[ \phi_j = f_j^S(S_j / S) + f_j^P(P_j / P) + f_j^R(R_j / R) \]

The terms \( f_j^S \), \( f_j^P \), and \( f_j^R \) are state \( j \)’s weights on sales, payroll, and property factors, respectively, in its apportionment formula; and \( S_j \), \( P_j \), and \( R_j \) are the firm’s sales, payroll, and property in state \( j \). Maximization of (Eq. T.1.1) yields first-order conditions:

(Eq. T.1.3) \[ qF_{K_j} \sum_h \theta_h \left[ I - \sum_h \theta_h \phi_h - (\pi / S) (f_h^S t_h - \sum_h (S_h / S) f_h^S t_h) \right] = \]

\[ \left[ I + (\pi / R) (f_j^R t_j - \sum_h (R_h / R) f_h^R t_h) \right] r \]
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and

\[(\text{Eq. T.1.4}) \quad qF_j \sum_h \theta_h [1 - \sum_h t_h \phi_h - (\pi / S) (f^S_h t_h - \sum_h (S_h / S) f^S_h t_h)] = \]

\[1 - \sum_h t_h \phi_h + (\pi / P) (f^P_j t_j - \sum_h (P_h / P) f^P_h t_h)]w\]

where states are indexed by \( h \) and \( h' \), and \( \theta_h \) is the proportion of marginal output sold in state \( h' \).

The first order conditions in (Eq. T.1.3) and (Eq. T.1.4) clearly illustrate the complicated incidence of the formula-apportioned corporate income tax, which can be seen to be equivalent to four separate firm-specific taxes: a nation-wide profits tax rate given by

\[(\text{Eq. T.1.5}) \quad \tau^S = \sum_h t_h \phi_h ,\]

and excise taxes (or subsidies) on sales, payroll, and property in each state \( j \) given by

\[(\text{Eq. T.1.6}) \quad \tau^S_j = (\pi / S) [f^S_j - \sum_h (S_h / S) t_h f^S_h] ,\]

\[(\text{Eq. T.1.7}) \quad \tau^P_j = (\pi / P) [f^P_j - \sum_h (P_h / P) t_h f^P_h] , \text{ and}\]

\[(\text{Eq. T.1.8}) \quad \tau^R_j = (\pi / R) [f^R_j - \sum_h (R_h / R) t_h f^R_h] .\]

The profits tax rate is given by the weighted average corporate tax rate across all states where the firm does business, where the weights are the apportionment percentages as measured in (Eq. T.1.2). The excise taxes (subsidies) arise from deviations from this average. Only in the case of uniform tax rates and apportionment formulas will the excise effects disappear, and a system of formula-apportioned corporate income taxes resembles a corporate tax levied at the national level.
T.2. Development Consequences of Strategic Apportionment Policies

To understand the likely economic impact of changes in apportionment formulas, we can examine how they affect the equivalent set of taxes in (Eq. T.1.5) – (Eq. T.1.8). Equations (Eq. T.2.1) and (Eq. T.2.2) show changes in the implicit taxes on productive factors that arise from a change in the sales factor weight in some state \( j \) (keeping in mind that \( df_j^p = df_j^s = -(1/2)df_j^s \)):

(Eq. T.2.1) \[
\frac{\partial \tau_j^p}{\partial f_j^s} = (-1/2)\left[\pi / R \right] \left[ 1 - \left( R_j / R \right) \right] t_j < 0
\]

(Eq. T.2.2) \[
\frac{\partial \tau_j^p}{\partial f_j^p} = (-1/2)\left[\pi / P \right] \left[ 1 - \left( P_j / P \right) \right] t_j < 0
\]

A relative increase in the sales factor weight unambiguously reduces the implicit tax rates (or increases the implicit subsidy) on productive factors, which should have a stimulative effect on production in the state, all else equal. The impact does stop there, however, as there are negative externalities for all other states. That is, state \( j \)’s single-factor sales formula not only subsidizes productive activity in state \( j \), but also taxes productive activity in all other states! 32 Algebraically,

(Eq. T.2.3) \[
\frac{\partial \tau_i^p}{\partial f_j^s} = (-1/2)\left[\pi / R \right] \left[ 1 - \left( R_j / R \right) \right] t_i > 0 \quad i \neq j
\]

(Eq. T.2.4) \[
\frac{\partial \tau_i^p}{\partial f_j^p} = (-1/2)\left[\pi / P \right] \left[ 1 - \left( P_j / P \right) \right] t_i > 0 \quad i \neq j
\]

The recently observed acceleration in state adoption of double-weighted sales and single-factor sales formulas is clearly understandable in light of these results. States increase the sales factor weight not only to encourage firm location and expansion, but also to “level the playing field” with other states that have aggressive apportionment policies.

While state \( j \)’s switch to a single-factor sales formula provides a tax incentive for production in that state (and disincentive for other states), the implicit sales tax is

32 Again, it should be kept in mind that these implicit excise taxes and subsidies are not collected, rather they reflect changes in relative tax rates. When state \( j \) moves to a single-factor sales formula, it makes the tax differential there more negative, and by definition, the tax differentials in other states more positive. Any combination of apportionment formulas will always lead to a result where the excise tax “collections” equal the subsidy “payouts.” That is, \[ \sum_h \left[ \left( R_j / R \right) t_j f_h^s - \left( R_j / R \right) t_j f_j^s \right] = 0, \] which also applies for payroll and sales factors.
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increased unambiguously, which should have the effect of discouraging sales in the state. Likewise, sales in other states are subsidized by state j’s policy change:

(Eq. T.2.5)  \[ \frac{\partial \tau^S_j}{\partial f^S_j} = \left( \frac{\pi}{S} \right) \left[ 1 - \left( \frac{S_j}{S} \right) \right] t_j > 0 \]

(Eq. T.2.6)  \[ \frac{\partial \tau^S_j}{\partial f^S_i} = \left( \frac{\pi}{S} \right) \left[ - \left( \frac{S_i}{S} \right) \right] t_j < 0 \quad i \neq j \]

Finally, the implicit profits tax rate may increase or decrease, depending on whether the firm is relatively sales-intensive or production-intensive in the state:

(Eq. T.2.7)  \[ \frac{\partial \tau^p}{\partial f^S_j} = t_j \left[ \left( \frac{S_j}{S} \right) - \left( \frac{1}{2} \right) \left( \frac{R_j}{R} \right) - \left( \frac{1}{2} \right) \left( \frac{P_j}{P} \right) \right] \]

If the firm has relatively more sales than productive factors in the state (as measured by the average of payroll and property), then (Eq. T.2.7) is positive and its overall tax liability increases.

A very common misperception (especially among policy makers) is that a single-factor sales formula encourages production only for firms that are relatively production-intensive in the state, because only these firms see their in-state tax liability decrease with the policy change. While true that sales-intensive firms suffer increased tax liabilities under a single-factor sales apportionment rule, they still are encouraged to produce more in the state. In fact, all firms will be stimulated to produce more in the acting state, regardless of the impact on their overall tax liability, because all firms will see their excise taxes on payroll and property reduced. This can be seen by appealing to the expressions in (Eq. T.2.1) and (Eq. T.2.2), which are independent of sales and the overall corporate tax liability. That is, sales-intensive firms can reduce their now higher tax liability by shifting production to the acting state.

While all firms benefit from lower taxes on productive factors with a single-factor sales formula, it is important to note that the tax differentials discussed above are functions not only of relative tax rates and apportionment factor weights, but are also a function of the degree to which the firms engage in economic activity in each state. Specifically, in a given state, there exists a direct relationship between the

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33Entirely local firms, who never face tax differentials, are an exception. Moreover, if firms were to always produce goods in the state in which they are sold, the excise effect on sales would play out as an excise on production.
degree to which the formula-apportioned corporate income tax mimics a profits tax and the concentration of the firm’s activity in that. To illustrate, consider the extreme cases where a firm has all of its productive activity in some state $j$. In this case, the excise effects on the apportionment factors given in (T.1.6) – (T.1.8) are all zero, and the profits tax rate given in (Eq. T.1.5) becomes simply the statutory corporate income tax rate in state $j$. The corporate income tax in any other state $i \neq j$ yields only excise effects. That is, should the firm consider shifting an infinitesimally small amount of capital from state $j$ to state $i$, the change in its profits tax would be approximately zero ($\tau^e \approx t_j$), while it would pay an excise tax (or receive a subsidy) of $\tau^r = t_i f^r_i - t_j f^r_j$.  

\[ ^{34} \text{The capital employed in region } i \text{ is sufficiently small that } R_i / R = 0 \text{ and } R_j / R = 1. \]
**T.3. Revenue Considerations**

To examine the revenue consequences of strategic apportionment policies, we first write total revenue collections in some state \( j \) as

\[ T_j = \sum_i \phi_{i,j} \xi_i \]  

(Eq. T.3.1)

where firms are indexed by \( i \) and \( \phi_{i,j} \) is the apportionment of firm \( i \)'s taxable profits (\( \xi_i = S_i - P_i \)) to state \( j \). The change in corporate tax revenues from a given change in the sales factor weight is then given by

\[ \frac{\partial T_j}{\partial f_j^S} = t_j \sum_i \left[ \left( \frac{\partial \phi_{i,j}}{\partial f_j^S} \right) \xi_i + \left( \frac{\partial \xi_i}{\partial f_j^S} \right) \phi_{i,j} \right] \]  

(Eq.T.3.2)

In order to understand the determinants of revenue impacts that arise from changes in apportionment formulas, we need only to look at the first term in the bracketed expression of (Eq. T.3.2), as revenue changes arising from changes in firm profitability (the \( \frac{\partial \xi_i}{\partial f_j^S} \) terms) will be shared across the states according to their apportionment percentages.

Changes in the apportionment of firm profits arising from changes in the formula (the \( \frac{\partial \phi_{i,j}}{\partial f_j^S} \) terms) depend largely on two factors: the market vs. production presence of firms within the state, which is a static effect, and the degree to which the policy induces changes in firm behavior, a dynamic effect. The static effect will be revenue-enhancing if

\[ \sum_i \xi_i \left[ (S_{i,j} / S_i) - (1/2) (R_{i,j} / R_i) - (1/2) (P_{i,j} / P_i) \right] > 0 \]  

(Eq. T.3.3)

That is, if the effect of an increase in the sales factor weight, exclusive of policy-induced shifts in sales and production, is to apportion more taxable profits to the state. One might expect the static effects of strategic apportionment policies to be more or less revenue neutral, as the effects from market-oriented and production-oriented firms would tend to cancel out; however, issues with nexus and the allocation of the sales factor suggest that the overall static effect would be negative for most states.
A dynamic revenue effect arises when firms alter their sales and production decisions in response to heavier sales factor weights. Firms are likely to be discouraged from selling in the state, which would decrease the apportionment of taxable profits there, all else equal. Likewise, firms are encouraged to shift production to the state, which would increase payroll and property factors, thereby increasing the apportionment of firm profits to the state. Of course, under a single factor sales formula, the dynamic revenue effect would be negative, as increased utilization of productive factors would not affect the apportionment of firm profits. With the exception of single-factor sales regimes, whether or not the dynamic revenue effect is positive or negative will depend on the relative strength of production incentives and sales disincentives.

The static and dynamic revenue effects, when taken together with complicating factors, suggest that the revenue impact of strategic apportionment policies is likely to be negative in most cases, a result that has been confirmed by most revenue impact studies. Nevertheless, there are externalities that should also be considered, but rarely are. For example, we might make a reasonable argument that while most states would be expected to suffer corporate tax revenue losses from increasing the sales factor weight in their apportionment formulas, the losses would be tempered to the extent that the policy is able to stimulate economic activity in the state. For example, increased payrolls would expand the individual income tax base, and hence revenues.
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