The Economic Impact of Single Factor Sales Apportionment for the State of New York

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Executive Summary

This study estimates the impact that switching to single factor sales apportionment would have on job creation and tax revenue for the State of New York. The estimates we present are based on a statistical examination of the experiences of other states that have modified their apportionment formulae during the last two decades. The analysis controls for other factors that can affect employment, such as state corporate tax rates, state trends, national unemployment rates, and the actions of other states regarding their apportionment formulae.

We find that increasing the weight on the sales factor has significant positive effects on in-state employment. Based on the analysis, we estimate that switching to single factor sales will have a long-run impact of increasing the number of manufacturing jobs in New York by about 3.5%, or about 32,000 jobs. We further estimate that the non-manufacturing sector would grow by about 1.3%, or 101,000 jobs. Together, the additional jobs would have a significant positive impact on the personal tax revenue collected by the State of New York. We estimate the long-run increase in personal tax revenue at approximately $184 to $247 million per year, an increase equivalent to 0.9% to 1.2% of the New York's fiscal year 1999 personal tax revenue of $20.6 billion. Any estimate of the corporate tax revenue losses of single factor apportionment needs to be balanced against the gains in individual tax revenue from the job creation.

1. Introduction

Faced with the continuing devolution of resources from the federal government to the states and the continuing decline of manufacturing across the country, state governments over the last twenty years have repeatedly changed their tax systems to encourage employment and investment. In addition to enterprise zones, tax concessions and more general tax cutting, one of the means that states have commonly used in the last two decades has been to increase the sales factor in the corporate income tax apportionment formula. By doing this, states have effectively reduced the tax cost of in-state employment and payroll, making it more attractive for business to produce in-state.

Prior research using general measures like the average corporate tax burden in a state or the statutory corporate tax rate coupled with aggregate data has often found negligible effects of tax policy. More recent studies looking at micro-level investment decisions or at more specific tax incentives such as Bartik (1985), Papke (1991), or Hines (1996) have found much larger effects.

This study examines the impact that state apportionment formulae have on state employment using data on the actual employment experiences of states that have increased their sales factor apportionment. We focus on employment effects in the manufacturing sector because that is the sector most likely to be affected by apportionment and is also a sector with above-average wages. In doing so, our results establish two important facts about these state tax policies.

First, we provide robust evidence that the apportionment formula has a large and significant real effect on a state's economy. The payroll weight is a significant determinant of state employment. Second, we show that these significant employment effects imply that although increasing the sales weight in a state may lead to corporate income tax revenue losses (see Pomp, 1987), the increased employment generates an indirect source of additional personal income tax revenue. The results suggest that this additional revenue reduces and may even exceed the corporate revenue loss for some recently proposed formula changes.

Applying these results to the State of New York, we find that increasing the sales weight in New York from 50 percent to 100 percent would have a long-run impact of increasing manufacturing employment by around 3.5 percent and non-manufacturing employment by about 1.3 percent. These new jobs would have a significant positive impact on individual income tax revenue to the State of New York. We estimate the long-run increase in personal tax revenue at approximately $184 to $247 million per year, equivalent to 0.9% to 1.2% of the New York's fiscal year 1999 personal tax revenue of $20.6 billion.[1] Based on the data from other states, the long-run increases tend to occur gradually over a period of three years or more. The increases are over and above normal levels of employment and revenue growth.

This study proceeds as follows. In Section 2 we describe how the composition of the apportionment formula can affect incentives to locate in a particular state. In Section 3 we describe the nationwide trend towards single factor sales apportionment. Section 4 presents the theory and background literature on formulary apportionment. In Section 5 we describe our

data set and our empirical approach. Section 6 presents the main results of the study, which point out the employment effects of the apportionment decision. Finally, in Section 7, we look at what the results would imply for New York changing to a 100 percent sales formula, including the impact on manufacturing as well as the revenue consequences of the change. We find that the increased employment generates a large amount of indirect revenue through increased personal income taxes.

2. How Apportionment Affects Incentives to Produce In-State

When corporations do business in more than one state, it becomes necessary to apportion their income among the various states for tax purposes. A particular state cannot, after all, levy a tax on the entire income of a multistate business. Rather, it must determine how much of that business's income is attributable to activities in that state. States often use three equally-weighted 'factors' in apportioning business income: property, payroll, and sales. The general formula is:

$$\text{Apportionment \%} = \left(\frac{\text{property in} - \text{state}}{\text{total property}} + \frac{\text{payroll in} - \text{state}}{\text{total payroll}} + \frac{\text{sales in} - \text{state}}{\text{total sales}} \right)\Big/ 3$$

For example, consider a corporation that does business in State X and as well as other states. State X uses the standard equally-weighted three factor apportionment formula. The corporation has 60 percent of its property and payroll and 80 percent of its sales in State X. The corporation's total income is $500,000. The apportionment percentages are (60% + 60%

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[1] *1998-99 New York State Tax Collections*, New York State Department of Taxation and Finance.

+ 80%)/3 = 67% for State X. Thus, two-thirds ($333,333) of the corporation's income will be taxable by State X.

The presence of property and payroll in the apportionment factor creates a disincentive to locate manufacturing in-state. Because of this, many states have begun to weight the sales factor more heavily and thus weight property and payroll less heavily. Some states now 'double weight' sales, so that half of the apportionment percentage is determined by sales and the other half is determined by property and payroll. Under double-weighted sales apportionment the formula is:

$$\text{Apportionment \%} = \left(\frac{\text{property in} - \text{state}}{\text{total property}} + \frac{\text{payroll in} - \text{state}}{\text{total payroll}} + 2\left(\frac{\text{sales in - state}}{\text{total sales}} \right) \right) \Big/ 4$$

Other states have gone even further, basing apportionment solely on in-state sales to total sales (i.e., single factor sales apportionment). In both cases, the objective is to make it more attractive for businesses to locate in their state.

3. The Nationwide Trend Toward Single Factor Sales

States historically used equal weighted three-factor formula to apportion income. Over time, however, states have acted to increase the sales weight in their apportionment formula to gain a competitive advantage in attracting and retaining business, particularly manufacturing business. Presently, twenty-three states have adopted double-weighted sales apportionment, six have adopted single factor sales apportionment, and four have adopted sales weights between single-factor sales and double-weighted sales apportionment.

Most of the large states with substantial manufacturing have acted to increase the weight on the sales factor. The states that have remained equal-weighted tend to be small states with little manufacturing (e.g., Alaska and North Dakota). Of the twelve largest states, excluding New York, all have adopted at least double-weighted sales and six have adopted heavier sales weighting. Among the largest states, the following use formula that emphasize the sales factor more than the State of New York:

- **Illinois** recently moved from double-weighted sales to single factor sales, fully effective in 2001.

- **Massachusetts** adopted single factor sales apportionment for manufacturers, fully effective in 2000.

- **Texas** has long used single-factor sales apportionment.

- **Michigan** recently modified its apportionment formula to be 90% weighted on sales.

- **Ohio and Pennsylvania** moved from double-weighted sales to 60% weighting on sales in 1999.

The following large states double-weighted their sales factor as the State of New York does:

- **California, Georgia, New Jersey** and **Virginia** in the mid and late 1990s each moved from equal weighted to double weighted sales apportionment.

- **Florida** and **North Carolina** use double-weighted sales apportionment.

4. The Theory and Literature of Formula Apportionment

Each state taxes corporate income at its own rate but corporations often do business in more than one state. The states, therefore, must decide how to apportion income between the firm's states of operation in order to avoid multiple taxation of the same income. Their solution has been to use an apportionment formula. The most common formula is to apportion firm income using three factors: property, payroll, and sales. If a firm's overall profit is p, then the profit attributed for tax purposes to state j, p_j, is

$$p_j = \left(a_j^P \frac{P_i}{P} + a_j^L \frac{L_i}{L} + a_j^S \frac{S_i}{S} \right) p \qquad (1)$$

where P is total property, L is the total payroll and S is total sales while P_j and L_j and S_j are property, payroll and sales in state j and a_j^f is the weight in the apportionment formula for factor f in state j. The most common formula has been a one-third weight on each factor (also known as the equal-weighted sales formula).

McClure (1980) has shown that using this apportionment formula largely transforms the corporate income tax into a direct tax on the factors in the formula. To see why note that the overall corporate tax rate in an individual state with formula apportionment and a statutory marginal tax rate t_j is

$$t_j = \left(a_j^P \frac{P_j}{P} + a_j^L \frac{L_j}{L} + a_j^S \frac{S_j}{S} \right) t_j \qquad (2)$$

and the firm's overall marginal tax rate, t, is simply the sum of the t_j over all its states of operation:

$$t = \sum_j t_j \mathbf{a}_j^P \left(\frac{P_j}{P} \right) + \sum_j t_j \mathbf{a}_j^L \left(\frac{L_j}{L} \right) + \sum_j t_j \mathbf{a}_j^S \left(\frac{S_j}{S} \right). \qquad (3)$$

Formula (3) makes clear that if a firm alters the location of its workers even with no change in its profitability, this will have a direct effect on its marginal tax rate. In the simplest example, if a firm changes payroll in state j by shifting payroll from other states but leaving its total payroll unchanged (i.e., $\partial L / \partial L_j = 0$), the firm's overall marginal tax rate will change according to [2]

$$\frac{\partial \tau}{\partial L_j} = \left(\frac{1}{L} \right) \left(t_j \alpha_j^L - \sum_{i \neq j} t_i \alpha_i^L \frac{L_i}{\sum_{i \neq j} L_i} \right). \qquad (4)$$

This equation shows that changing employment at the margin raises the firm's marginal tax rate by an amount that depends positively on state j's payroll tax burden and negatively on the weighted average of the other states' payroll tax burdens.

Depending on how much firms respond to marginal tax rates, states may be able to reduce their payroll weight, increase their sales weight, and thereby reduce the tax burden on employment in their state by partially exporting the tax to out-of-state companies. Policy makers understand this aspect of the tax exporting issue and as a result, have repeatedly changed state apportionment formulae to increase the sales weight.

While there has been very little research on the apportionment formula itself, there is a tremendous amount of research on the effect of taxation on business location and economic development generally. There have been studies of the impact of corporate taxes, infrastructure

and other services, wages and a variety of other factors on investment in states that are beyond the scope of this study. For two good surveys of the literature see Phillips & Goss (1995) or Bartik (1992). Most studies have found significant impacts of corporate tax rates and other tax factors on investment. The estimated tax price elasticity usually falls between -.3 and -.8, implying that a 10 percent tax cut increases the investment in a state by 3-8%.

There is also a literature concerning the extent to which states can "export" their tax burdens to other states by changing their tax codes. This is a key issue in the context of the apportionment formula since the goal is to reward within state firms at the expense of out-of-state firms. The evidence on the general topic of tax exporting is mixed, with some studies claiming large export possibilities and others saying the opposite (for a general review see Mutti & Morgan, 1993).

Though the apportionment formula used to allocate income across states for the corporate income tax does not change the tax rate, it can have an important effect on the incentives to locate business in a given state. So long as property and payroll are used in a apportionment formula, expanding employment or property in the state will increase the company's tax burden. This creates a disincentive to locate in the state.

Theoretical work such as McLure (1980), Gordon and Wilson (1986), and Anand and Sansing (1997) has indicated that the apportionment formula should affect economic decisions. This paper empirically examines the effects of formulary apportionment using a rich set of data on the employment levels and apportionment formulas of states during the past two decades.

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[2] This assumes, for simplicity, that the shift from each state is proportional to it current share of payroll.

Our results bring the empirical results in line with the theoretical findings and to highlight the importance of state level decisions.

5. Methodology and Sample Selection

This paper uses the methodology from Goolsbee and Maydew (2000) on a panel data set of the apportionment formulae, corporate tax rates, and economic variables for states from 1978-1999. During this period approximately 27 states have increased their apportionment formula and this variation allows us to develop reasonably precise estimates of the economic effects of apportionment. Because of the long time period, we are also able to control for economic factors that independently influence employment.

The data used in our study are as follows. First the time series on the apportionment formulae cover all states with a corporate income tax. These data are gathered from Commerce Clearing House's *State Tax Handbook*, various state tax codes, issues of *Significant Features of Fiscal Federalism* and discussions with various state departments of revenue.

Figure 1 shows the number of states that have adopted more than the standard 1/3 weight on sales in their apportionment formulas during the sample, not counting states with optional apportionment formulae. There is a consistent upward trend that begins after 1978 with the Moorman case in which the Supreme Court ruled that Iowa's use of the single factor sales apportionment formula was constitutional. Once the constitutionality of increased weight on the sales factor had been established, it was only a matter of time until states began trying to export their corporate income tax burdens onto businesses in other states.

We match these apportionment formulae with state employment and earnings data compiled by the Bureau of Economic Analysis. These data include total private employment and total manufacturing employment by year for each state and are compiled from the ES-202 series of the Bureau of Labor Statistics and reported in the B.E.A.'s *State Personal Income* database. For the national economy, we use data on the unemployment rate and the log of national employment. We allow the coefficient on the latter to vary by state in an attempt to control for population changes in a way that is not endogenous. The descriptive statistics for all the data in our sample are listed in table 1.

Using these data, our basic empirical specification will regress the log of employment in state j in year t as follows:

$$\ln(EMPL_{jt}) = \alpha_j + \beta_1(Tax_{jt}) + \beta_2(\overline{Tax_t}) + \Gamma_1'Z_t + \Gamma_2'X_{jt} + \varepsilon_{jt} \qquad (6)$$

where Tax_{jt} includes measures of the apportionment induced tax burden on payroll in the state, $\overline{Tax_t}$ is the weighted average tax burden on payroll for all states in that year, the Z_t are annual controls to account for macroeconomic factors that independently influence state employment (e.g., the national unemployment rate), and the X_{jt} are state level controls as well as state specific time trends.

The basic approach is to estimate whether, conditional on the state of the economy and other variables, employment is higher when a state puts less weight on the payroll factor in its apportionment formula. The results below support the proposition.

6. Results

Column (1) of Table 2 presents a basic panel regression for the log of manufacturing employment in a state on the tax terms, state fixed effects, state time trends, the national unemployment rate, and the log of national employment interacted with the state dummies to account for growth in the labor force. Following the theory presented above, our tax terms are the state corporate tax rate (after accounting for federal deductibility of state taxes) interacted with the payroll weight in the apportionment formula and the weighted average of the same variable for all states in that year (states are weighted by average manufacturing employment over the sample). To account for long-run effects we include the current payroll burden as well as one and two-year lagged payroll burdens. The effects of the current and lagged payroll burdens are accumulated in Table 2 to reflect the long-term impact of apportionment changes.

In this basic specification, the coefficients are significant and have the predicted signs. The non-tax variables are unsurprising and the tax variables are statistically significant. Reducing the tax burden on payroll in the state by reducing the corporate rate or the payroll weight in the apportionment formula increases manufacturing employment significantly. When other states reduce their payroll tax burden it does the opposite.

As a check on robustness, column (2) presents a regression that does not take into account federal deductibility of state taxes. The results are similar to those in column (1).

While these specifications seem to indicate that the apportionment formula is important, both specifications impose that the apportionment formula and the corporate tax rate have identical effects. The apparent effect of apportionment changes, however, might be caused by spurious correlation with some other variable. Firms may respond only to the corporate rate,

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for example, and by including only an interaction term this makes the payroll weight look significant. On the other hand, if the true marginal tax rate facing the firm differs from the statutory rate, this measurement error will tend to reduce the estimated effect of the apportionment formula in the interaction term.

Column (3), therefore, repeats the specifications of (2), but breaks the income tax induced payroll burden into two components: the payroll weight and the corporate tax rate. The results indicate that the corporate tax rate does not reduce the importance of the payroll weight. Indeed, the coefficient on the tax rate is not significantly different from zero, consistent with the measurement error view, while the coefficient on the payroll weight is both significant and the estimated effect is quite large.

Finally, in column (4) we examine the impact on non-manufacturing employment. We expect the results to be proportionally smaller here than in the manufacturing sector. The coefficient on the tax rate shows that, indeed, apportionment changes do have a smaller effect on non-manufacturing but the effect is still statistically significant.

7. New York - Job Creation and Revenue Implications

In this section we look in detail at the employment effects on New York and the consequent revenue implications for the state. Since the specific estimates vary with the empirical specification, we present our most conservative point estimates, which are those presented in Table 2 column (1). Based on this analysis, we estimate that switching to single factor sales will have a long-run impact of increasing the number of manufacturing jobs in New York by about 3.5%. At New York's base of about 919,000 manufacturing jobs (1998

estimate), this translates into about 32,000 new jobs just in manufacturing. The same data gives

New York's total employment at 8,577,000 and non-manufacturing employment at 7,658,000.

The results in column (4) suggest that for New York, changing to single factor sales would raise

total employment by approximately 133,000 jobs. Subtracting the increase in manufacturing

employment results in approximately a 101,000 increase in non-manufacturing employment, or a

1.3% increase. These long-run effects may occur gradually over a period of three years or

more.

In addition to the obvious benefits of greater employment, there are also important tax

revenue implications from the new jobs. Using 1998 Bureau of Economic Analysis data, we

find that the average non-manufacturing worker in New York makes $39,400 per year, with

manufacturing workers averaging $46,000. If the jobs created by the apportionment change are

like these average jobs, we estimate that this will generate on the order of $184 to $247 million

in individual tax revenue per year in the long-run.[3] The projected increase in tax revenue is

equivalent to 0.9% to 1.2% of the New York's fiscal year 1999 personal tax revenue of $20.6

billion. There is also likely to be a positive dynamic effect on other tax revenues such New

York City income tax revenues, as well as sales and property tax but we do not have data to

calculate the magnitudes of these effects.

There should also be a positive dynamic effect in corporate tax revenues from the

increase in business activity in New York, but we omit this effect to err on the side of

conservatism. Overall, in the long-run we find very clear evidence that such a switch would

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[3] The smaller revenue estimates assume that all of the new jobs are filed by married taxpayers with non-working spouses and two children apiece (dependents). Assuming some working spouses would increase

increase employment substantially, generating extra personal income and personal income tax revenues for the State of New York. Any estimate of the corporate tax revenue loss arising from single factor sales apportionment must be balanced against these additional revenue gains from job creation. Failing to consider this dynamic effect will result in severe underestimation of the revenue aspects of this policy.

8. Conclusion

This study estimates the impact that switching to single factor sales apportionment would have on job creation and tax revenue for New York. Our estimates are based on the actual experiences of states that have increased the weighting on the sales factor in the apportionment formula over the period 1978-1999. The analysis controls for other factors that can affect employment, such as state trends, changes in national unemployment rates, and the actions of other states regarding their apportionment formulae.

We find that increasing the weight on the sales factor has significant positive effects on in-state employment. In our estimation, switching to single factor sales will have a long-run impact of creating an additional 32,000 manufacturing jobs and 101,000 non-manufacturing jobs in New York. These new jobs will have positive long-run effects on the State's fiscal health, creating an estimated $184 to $247 million in personal tax revenue annually. Coupled with neighboring states' aggressive modification of their own apportionment formulae, these

the tax revenue estimates. The larger revenue estimates assume that one-half of the new jobs are filled by people filing single and one-half are filled by married people.

results underscore the need for the State of New York to act promptly to remain competitive

and avoid revenue and job losses to other states.

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Figure 1

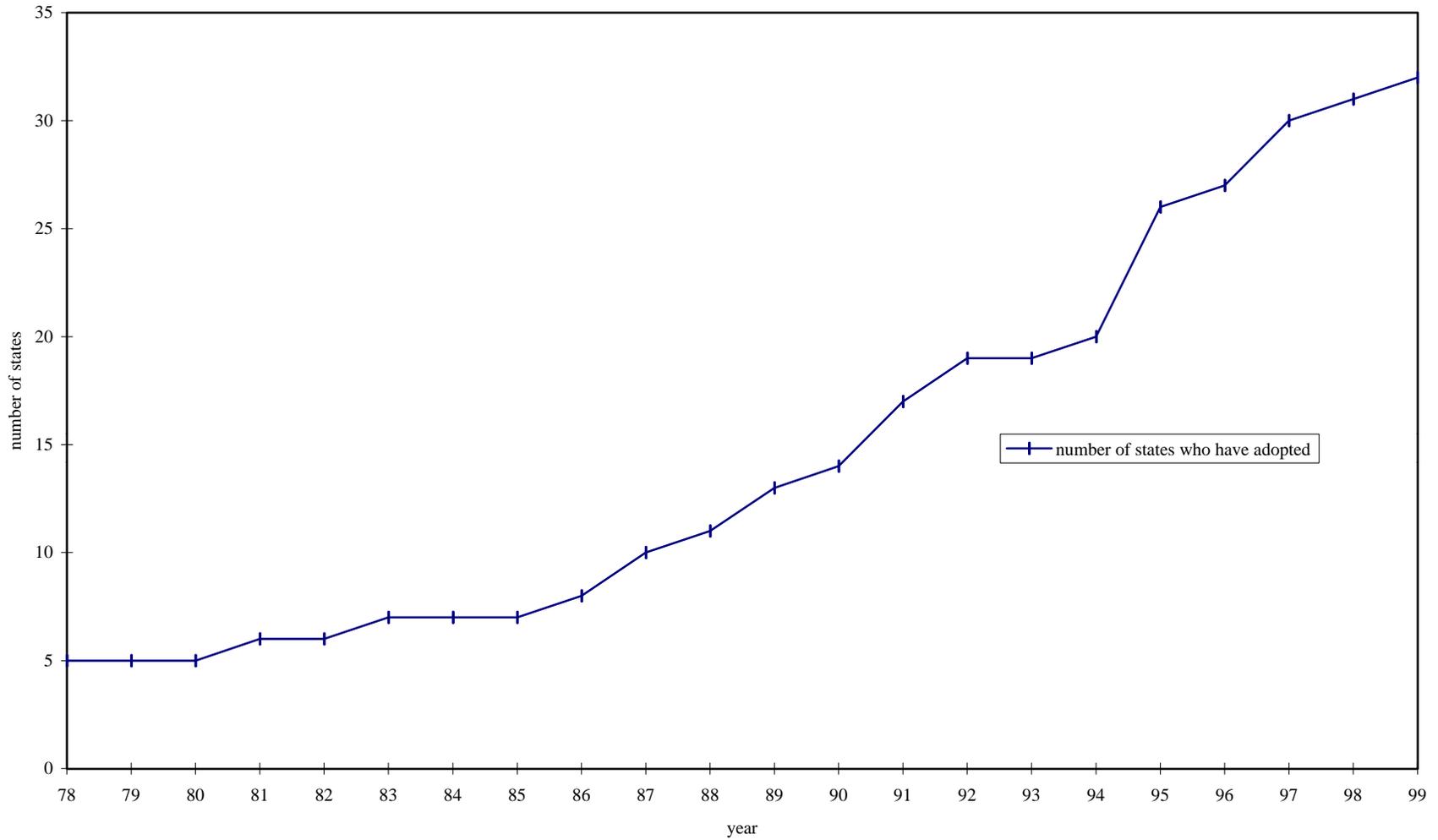Number of States That Have Adopted an Increased Weighting on Sales Factor

Table 1

Descriptive Statistics for State Panel from 1978-99

Variables[a]	Mean	Standard deviation
Payroll weight	0.296	0.071
State payroll burden	0.0132	0.0056
State corporate tax rate	0.0752	0.0332
Federal corporate tax rate	0.389	0.054
Ln(national employment)	4.742	0.0932
National unemployment rate	0.065	0.015
Ln(manufacturing employment)	12.28	1.199
Ln(total employment)	14.164	0.97
Number of Observations	894	

[a] *Payroll weight* is the payroll weight in the apportionment formula (e.g., 33%, 50%, 100%).

State payroll burden is (state corporate tax rate - state corporate tax rate x federal corporate tax rate) x payroll weight.
State corporate tax rate is the top corporate statutory rate imposed by the state.
Federal corporate tax rate is the top corporate statutory rate.
Ln(national employment) is the log of national total employment
National unemployment rate is the national unemployment rate in percent.
Ln(total employment) and Ln(*manufacturing employment*) are the log of total employment and manufacturing employment, respectively.

Table 2

Regressions of Manufacturing Employment and Total Employment
on the Weight on Payroll in the Apportionment Formula and Control Variables

Independent variables	Ln(Manufacturing Employment)[1]			Ln(Total Employment)
	(1)	(2)	(3)	(4)
State payroll burden: cumulative (incl. Federal)	-3.148			-1.346
	(1.466)			(0.687)
State corporate tax rate: cumulative			-0.577	
			(0.610)	
State payroll burden: cumulative		-2.729		
		(0.905)		
Payroll weight: cumulative			-0.258	
			(0.101)	
Mean of all states' payroll burden: cumulative (incl. fed.)	8.664	5.580	7.514	3.084
	(3.148)	(2.689)	(3.385)	(1.904)
National unemployment rate	-3.869	-3.689	-3.781	-1.778
	(0.433)	(2.519)	(0.436)	(0.297)
(National employment) x (state dummies)	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
State trends	Yes	Yes	Yes	Yes
R^2	0.99	0.99	0.99	0.99
Number of observations	850	850	850	894

standard errors in parentheses

[1] See Table 1 for variable definitions.

Coefficients for the cumulative variables are the sum of the coefficients of the current, once and twice lagged values of the variable.