Appendices to:

A New Panel Database on Business Incentives for Economic Development Offered by State and Local Governments in the United States

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APPENDIX A: MORE DETAILS ON METHODOLOGY AND DATA

Sales Taxes and Gross Receipts Taxes

As mentioned in the text discussion, the sales tax "burden" on business-location decisions is NOT what the business pays on its own sales, but rather how much in taxes the firm will pay in sales tax on its purchase of business inputs from other businesses. We assume sales tax paid by the firm based on its sales within the state is passed on to the buyers and does not burden the firm. But the firm *is* burdened by sales taxes on its business inputs.

The business inputs to be considered are the following:

- The firm's initial purchase of the building, which is assumed to be newly constructed.
- The firm's initial purchase of machinery and equipment.
- The firm's annual purchase each year of sufficient building investment and machinery and equipment investment to offset the annual depreciation of these items.
- The firm's annual purchases each year of intermediate inputs: materials, energy, and services.

Given the structure of the model—a firm locating in a state, then building and equipping a new plant from scratch—the potential sales tax burden will be very large the first year, and smaller but persistent in subsequent years.

We therefore have to determine the sales tax rate that applies in the state each year to the following categories:

- building construction
- machinery and equipment
- materials
- energy
- services

Materials are assumed to be completely exempt from the sales tax for all industries except for construction, where they are assumed to be fully taxable.[1] Machinery and equipment are always assumed to be completely taxable, unless the state allows for an exemption for manufacturing machinery and equipment. We do not consider possible exemptions for non-manufacturing machinery and equipment. Energy is treated similarly: we assume it is taxable always for nonmanufacturing, and taxable for manufacturing unless it is indicated that it is exempt in that state. In addition, in some cases the state indicates that machinery and equipment or energy purchases are "partially exempt" for manufacturing, which we treat as meaning 50 percent exempt and 50 percent taxable.

Services used as inputs by businesses are assumed to mostly be nontaxable but to have a national average of having 11 percent of their value taxed, based on research by Cline et al. (2005). This is assumed to vary proportionally across states according to a Federation of Tax Administrators (2007) count of how many services that might be consumed by businesses are taxed in each state.[2]

Construction inputs to business are assumed not to be directly taxed. However, we assumed that construction contractors pass on, in higher building costs, some of the higher costs they face from buying their inputs, such as inputs of energy and services and construction materials. We assume that the percentage of construction output that is effectively subject to the

[1] Irrational as this might appear, this seems to be consistent with state sales tax laws. See Mikesell (2001, p. 563): "When contractors purchase materials, these purchases are almost universally taxed under the sales tax. Contractors . . . pay tax on materials they purchase, and do not collect tax on their construction contracts. This treatment . . . means that business purchases of buildings and other infrastructure . . . will bear an embedded sales tax."

[2] The FTA specifically warns against using the data in this way, on the sensible grounds that this does not account for relative purchases of different items or for more details in exactly what is and isn't taxable. However, all we are trying to do here is to at least roughly distinguish between states that tax a lot of business-to-business services versus those that don't. This seems more accurate than assuming uniformity in services taxation across states.

sales tax burden that accompanies business purchases is equal to the sum of three elements: 1) the proportion of construction output that is business purchases of energy, plus 2) raw materials, plus 3) the proportion of business services in general taxed in that state. This ends up being a percentage ranging from 38 to 41 percent across the states. In determining the proportion of the sales tax paid on building construction, both in the first year and to offset depreciation in later years, we multiply the total state and local sales tax rate times this percentage times the firm's assumed purchases of buildings in each year.

In calculating the actual sales tax paid, we multiply the combined state and local sales tax rate times the firm's assumed purchases in each year of the five types of inputs—1) building construction, 2) machinery and equipment, 3) materials, 4) energy, and 5) services—times the proportion of each of those types of inputs that is assumed to be taxable for that state and that industry. These calculations of actual taxes paid are used in eventually calculating the present value of net state and local taxes paid by each firm.

In calculating taxable profits, however, we do not treat the firm's sales tax due on its initial building construction and on machinery and equipment as being how taxable profits will be calculated. As explained above, we calculate taxable profits each year by instead using the depreciation on buildings, and on machinery and equipment, as a measure of the firm's deductible costs for tax purposes of these capital investment items. So for purposes of calculating taxable profits, in the initial year only, we substitute for the actual capital investment in buildings and machinery and equipment the depreciation of these two items, and then we multiply this by the assumed percentage of buildings and machinery and equipment that is assumed to be taxable for that industry and state, and then by the combined state and local sales tax rate. As explained above, this same calculation is the correct calculation for determining taxable profits each year.

But in subsequent years after Year One, this calculation happens to also be correct as a measure of actual sales tax paid.

A few states also have a gross receipts tax, most notably Ohio, Washington, and New Mexico. Ohio's and Washington's tax stands in for a corporate income tax and is regarded in these states as the state's main business tax. New Mexico's gross receipts tax is applied in addition to a state corporate income tax and seems, within the state, to be regarded more as a sales tax.

Because these gross receipts taxes only apply to sales within the state, we treat these taxes as if they were sales taxes. In other words, we treat their burden on business as not being the gross receipts tax that the firm pays on its own receipts, as that is assumed to be passed on to buyers. Rather, the business burden is gross receipts tax applied to business purchases of inputs.

However, because of the way the gross receipts tax is framed—as a tax on the business's gross receipts—it tends to be applied, in practice, to more business inputs than the sales tax. We assume that the treatment of services inputs, building/construction inputs, and materials inputs is the same as under the state's sales tax. However, we assume that all machinery and equipment inputs and energy purchases under the gross receipts tax are fully taxed, with a few exceptions for energy in the past few years for New Mexico.

In the case of Washington, we also need to calculate gross receipts taxes that are nominally owed by each firm, based on its Washington sales (assumed in the model to be 10 percent of gross output for export-base industries, 100 percent for non-export-base industries). This is because these gross receipts paid by the firm can be offset by R&D tax credits in Washington, and we need to know what the maximum credit is that can be taken. However, we do NOT, even in Washington, treat the gross receipts tax on the firm's own receipts as being a

business tax burden. So we essentially treat the R&D tax credit taken against the gross receipts tax as being a refundable credit to the firm whose magnitude is determined by this feature of the tax system.

R&D Tax Incentives

Research and development tax incentives are one of the most complicated state tax incentives, both complex to understand and complex to model. R&D tax incentives began at the federal level, and perhaps in many states, as a way of targeting only INCREASES in R&D spending. But in practice, as these incentives have evolved, they frequently target simply any firm with high R&D spending, and to some extent any firm at all. This is particularly true at the state level, where the "base" R&D spending for new firms is low.

Many states use the federal base definitions in calculating R&D incentives. There is no substitute for simply quoting the relevant federal law for defining the R&D base for calculating federal R&D incentives. It is as follows:

> " **(c) Base amount**
>
> **(1) In general**
>
> The term "base amount" means the product of—
>
> **(A)** the fixed-base percentage, and
>
> **(B)** the average annual gross receipts of the taxpayer for the 4 taxable years preceding the taxable year for which the credit is being determined (hereinafter in this subsection referred to as the "credit year").
>
> **(2) Minimum base amount**
>
> In no event shall the base amount be less than 50 percent of the qualified research expenses for the credit year.
>
> **(3) Fixed-base percentage**
>
> **(A) In general**

Except as otherwise provided in this paragraph, the fixed-base percentage is the percentage which the aggregate qualified research expenses of the taxpayer for taxable years beginning after December 31, 1983, and before January 1, 1989, is of the aggregate gross receipts of the taxpayer for such taxable years.

(B) Start-up companies

(i) Taxpayers to which subparagraph applies. The fixed-base percentage shall be determined under this subparagraph if—

(I) the first taxable year in which a taxpayer had both gross receipts and qualified research expenses begins after December 31, 1983, or

(II) there are fewer than 3 taxable years beginning after December 31, 1983, and before January 1, 1989, in which the taxpayer had both gross receipts and qualified research expenses.

(ii) Fixed-base percentage. In a case to which this subparagraph applies, the fixed-base percentage is—

(I) 3 percent for each of the taxpayer's 1st 5 taxable years beginning after December 31, 1993, for which the taxpayer has qualified research expenses,

(II) in the case of the taxpayer's 6th such taxable year, 1/6 of the percentage which the aggregate qualified research expenses of the taxpayer for the 4th and 5th such taxable years is of the aggregate gross receipts of the taxpayer for such years,

(III) in the case of the taxpayer's 7th such taxable year, 1/3 of the percentage which the aggregate qualified research expenses of the taxpayer for the 5th and 6th such taxable years is of the aggregate gross receipts of the taxpayer for such years,

(IV) in the case of the taxpayer's 8th such taxable year, 1/2 of the percentage which the aggregate qualified research expenses of the taxpayer for the 5th, 6th, and 7th such taxable years is of the aggregate gross receipts of the taxpayer for such years,

(V) in the case of the taxpayer's 9th such taxable year, 2/3 of the percentage which the aggregate qualified research expenses of the taxpayer for the 5th, 6th, 7th, and 8th such taxable years is of the aggregate gross receipts of the taxpayer for such years,

(VI) in the case of the taxpayer's 10th such taxable year, 5/6 of the percentage which the aggregate qualified research expenses of the taxpayer for the 5th, 6th, 7th, 8th, and 9th such taxable years is of the aggregate gross receipts of the taxpayer for such years, and

(VII) for taxable years thereafter, the percentage which the aggregate qualified research expenses for any 5 taxable years selected by the taxpayer from among the 5th through the

> 10th such taxable years is of the aggregate gross receipts of the taxpayer for such selected years.
>
> 41(c)(3)(B)(iii) TREATMENT OF DE MINIMIS AMOUNTS OF GROSS RECEIPTS AND QUALIFIED RESEARCH EXPENSES.—The Secretary may prescribe regulations providing that de minimis amounts of gross receipts and qualified research expenses shall be disregarded under clauses (i) and (ii).
>
> 41(c)(3)(C) MAXIMUM FIXED-BASE PERCENTAGE.—In no event shall the fixed-base percentage exceed 16 percent."

This is the standard federal base definition. There also is an alternative base calculation which was adopted more recently, which we ignore both for simplicity's sake and because not all states that use the federal base calculation allow the alternative calculation.

At the state level, the key thing to understand is that the state R&D incentives will be based on the firm's R&D spending in the state and not nationally, and on the firm's gross receipts from the state and not its gross receipts nationally. In our model, we are assuming a firm new to the state, with no previous taxable nexus with the state. Therefore, its prior state R&D spending is zero, and its prior gross receipts are zero. Furthermore, for the export-base firms that are the focus of this model, what matters are the firm's gross receipts from this state. These are assumed to be only 10 percent of the firm's gross output.

The consequence of this is that this new firm initially has no prior R&D spending in the state, and certainly no prior spending during the 1983-to-1989 period. Therefore, the firm for state purposes is a "start-up" firm even if it has a long history nationally. Furthermore, its previous gross receipts in this state are zero. And once it starts up, its gross receipts will be only 10 percent of its total output if it is in an export-base industry (100 percent if the firm is in a non-export-base industry).

As a consequence, during the initial five years (for example), for export base firms, the "fixed base percentage" will be 3 percent of state gross receipts, which will be only 0.3 percent

of the firm's total output. In many cases, the firm's R&D spending will exceed 0.6 percent of the firm's total output. In those cases, the provision that will be invoked in these states is that the base must be at least half of actual research spending. The effect is that in these cases the state's R&D credit is in effect applied to half of the firm's research spending for its first five years in the state.

The base amount then ratchets up in subsequent years, so that by years 11 through 20, the base-year percentage of the firm's gross receipts in this state is based on the ratio of state research spending to state gross receipts in various years from years 5 through 10. Because we are assuming a firm has fixed real state research spending and real state output and real gross receipts allocable to this state, it might seem as if now the base is simply equal to actual research spending for the state, and the firm will receive no R&D credit. But this is not true for the higher R&D spending industries. The maximum provision is that the base never can be greater than 16 percent of gross receipts, which for export-base industries will amount to 1.6 percent of the firm's gross output as measured in our model.

At an extreme, for example, the R&D spending-to-output ratio for computers is 14.9 percent in our model. Because this is more than twice the firm's maximum percentage applied to its base of 1.6 percent of the firm's gross output (16 percent of the firm's state gross receipts), the minimum rule still applies. Even in years 11–20, firms in the computer industry will still nominally be able to claim R&D credits on half their research spending. Of course, these credits may exceed the firm's state taxes, in which case they must be carried forward unless the state R&D credit is refundable (which it is in a few states, most notably Iowa, Louisiana, Massachusetts [life sciences only], Minnesota [in the past], Nebraska, New York, and Pennsylvania).

Other states use their own bases, in which state research spending is compared with past research spending in the state. Again, for firms new to a state, which is what we are modeling here, these R&D credits end up being awarded to most if not all of the firm's research spending for its first years. Some states even more explicitly seek to award all research spending, not just incremental spending, by defining R&D spending relative to some lower percentage of prior research spending, or by having a separate research credit on base spending.

The bottom line is that state R&D credits can for some firms be quite large. The only factor limiting these credits is that, in many states, there is only a certain annual dollar volume of credits to be handed out. Once these are allocated, either selectively or first-come first-served, the state is not obligated to hand out any more. What this means is that this model's calculation of the dollar magnitude of R&D credits represents a best-case scenario for the firm (and a worst-case scenario for the state's revenue base) of the firm being able to get access to the nominally available R&D credits.

As with the investment tax credits (ITCs) and job creation tax credits (JCTCs), R&D tax credits (R&DTCs) are sometimes refundable, but in other cases are limited either by corporate tax liabilities or in some cases by corporate tax liabilities plus the firm's payments to the state, either against some other business tax liabilities or sometimes also against workers' withholding taxes.

Wage Standards

Some states have wage standards that apply to JCTCs, or in South Carolina's case ITCs. These standards typically vary the amount of credit so that higher-wage jobs are favored.

To deal with this, we try to approximate the distribution of wages for each industry. To calculate the wage distribution of workers by industry requires some assumptions. We assume

that wages of each firm are lognormally distributed. The mean ln(wage) is calculated for each industry, based on mean wages and assuming log normality of wages. The variation of ln(wage) within establishments is assumed to be 0.287, based on Barth et al. (2014). With an assumed mean ln(wage) and variance of such, we can generate for each industry the proportion of workers in each wage category. These industry proportions, and the formula for how JCTCs or ITCs vary with the number of workers in different wage categories, allows us to calculate credits for a state that vary by the industry's wages.

Personal Income Tax Withholdings

For some credits in some states and some years, the credit can be written off against the withholdings the firm does against the personal income tax liability of employees. Therefore, to figure out how much in these credits can be taken, such personal income tax withholdings need to be calculated for a typical firm in each industry, even though such personal income tax withholdings are not a business tax liability or burden of the firm. To do so requires some data on average effective personal income tax rates in each state.

To calculate average effective personal income tax rates, we take data from the Institute on Taxation and Economic Policy (ITEP) on effective personal income tax rates for different income groups (Davis et. al. 2013). ITEP breaks down these personal income tax liabilities into seven groups: 1, 2, 3, and 4) the four bottom quintiles, 5) the top 1 percent, 6) the next 4 percent (95th through 99th percentiles), and 7) the next 15 percent (80th through 95th percentiles). For each group, in addition to reporting the average effective personal income tax rate, ITEP reports the average income level for that income group. Using these data, we can calculate the average effective personal income tax rate in the state. This average effective personal income tax rate is

applied to the firm's wage payments to determine a plausible value of income tax withholdings, which will limit the credits that can be taken for some state credits.[3]

Inflation and the Real Value of Credits Provided over Time or Delayed through Carry-Forwards

Some credits have a nominal value but are awarded over multiple years. For example, this is sometimes true of investment tax credits and job creation tax credits. In addition, in cases where tax credits are carried forward, what is carried forward into future tax years is the remaining nominal value of the credit. As a result, inflation erodes the real value of these credits.

For all these cases, the nominal credit available in future years is adjusted for price changes between the time the credit was awarded and the time the credit is taken. This adjustment is based on actual inflation rates observed in the nation, where such data are available. For years beyond the present, the most recent inflation rate is assumed to be continued for the next 20 years.

Minimum Taxes

As mentioned in the main text, credits are often limited to no more than the corporate income tax liability, or sometimes the corporate income tax liability plus business payments under some other tax (e.g., gross receipts tax payments, sales tax payments on sales, sales tax payments on input purchases, or withholdings for workers). However, more complicated situations can arise because some states have credit limitations that lead to effective minimum tax rates.

[3] Ideally, it would be nice to vary the effective personal income tax rate by industry. We leave that to future versions of this model.

For example, in Illinois, most credits can only be taken against the regular corporate income tax. This means that the replacement corporate income tax acts as a minimum tax for many firms. Firms can take an investment tax credit against this replacement tax, but no other credits.

In Connecticut, in general credits are limited to 70 percent of the initial corporate income tax liability. This effectively establishes a minimum corporate tax liability of 30 percent of the corporate income tax. Connecticut did have a job creation tax credit for two years that overrode this limit, but otherwise no combination of the various ITCs, JCTCs, and R&DTCs could exceed 70 percent of the corporate income tax in Connecticut in one year. The rest had to be carried forward.

New York also formerly had an effective alternative minimum tax. In general, the various credits in New York could not lower firms' tax liability below what would be obtained by multiplying the firms' profits (after adjusting for property taxes, abatements, and sales taxes) by this AMT rate. The rest had to be carried forward, or taken against other tax bases if allowed. In addition, there was one exception to this rule: the Empire Zone program from 2001 to 2009 allowed a large percentage of the corporate income tax to be wiped out without considering the AMT. After examining AMTs in other states (California, Florida, Iowa, Kentucky, Minnesota), it does not appear that they really limit state tax credits. These AMTs basically serve to allow states to add back in various tax preferences permitted under the normal federal corporate income tax.

In addition, for many state tax credits, there is some provision that limits the tax credit to being no more than *x* percent of the state corporate income tax. Contrary to what one might

think, this provision is interpreted very differently by the revenue authorities in the various states.

In many states, this limit is simply interpreted as saying that this individual credit cannot be taken in any one year to be more than *x* percent of the firm's corporate income tax liability before any other credits are taken (Massachusetts, New Mexico, Tennessee, Texas). This may limit the tax credit in that year, or it may not. For example, if other credits are present that already reduce corporate income tax liability by $(1 - x)$ percent or more, then the *x* percent limit on this credit does not limit the credit any more than it is limited already by total corporate tax liability.

In South Carolina, credits can be taken in any order preferred by the firm (with the exception that the R&D credit must be taken last), and the 50 percent credit limit applies to the remaining tax liability measured sequentially. In Georgia, in contrast, the 50 percent limit on the R&D credit means that this credit must be taken after all other credits have been taken, and the credit is limited to 50 percent of the remaining tax liability after all other credits have been taken.

Finally, in North Carolina, all the credits that are subject to the 50 percent limit are summed together; after all other credits are taken, these credits collectively are limited to no more than 50 percent of the remaining tax liability.

A final credit point is about what "refundability" means. If refundability is 100 percent, there is no limit: 100 percent of the credit is allowed. If the credit refundability is limited to some percentage *x* of less than 100 percent, state rules in general interpret this as follows: after the credit is taken against the corporate income tax (or whatever taxes the credit is being taken against), *x* percent of the REMAINING credit can be refunded. It is not *x* percent of the original credit before some of it was taken against the corporate income tax. Furthermore, in a few cases,

such as Massachusetts, the 90 percent refundability allowed also means that the remaining 10 percent can no longer be carried forward. Given that we assume a 12 percent real discount rate we would assume that the firm would prefer 90 percent upfront.

Deductibility of Federal Corporate Income Taxes from State Income Taxes

A few states allow federal corporate income taxes to be totally or partially deducted in calculating state corporate income tax liability. For these states, we assume the effective corporate income tax rate is not the nominal state tax rate, but rather a function of that rate,[4] specifically:

Effective state tax rate = Nominal state rate × [1 − (proportion of federal tax that is deductible) × (effective federal corporate income tax rate)].

Based on USGAO (2013), the effective federal corporate income rate is assumed to be 12.6 percent.

The federal corporate income tax allows all state and local taxes and credits to be considered in calculating the federal tax. However, in our model we ignore federal corporate taxes because such taxes would have the same proportional effects in all states and cities. That is, if our model calculates state and local taxes and incentives as a percentage of value-added to be *Ts* and *Is*, and the federal corporate income tax rate on that firm is *Tf*, then the actual taxes and incentives as a percentage of value-added will be $Ts(1 - Tf)$ and $Is(1 - Tf)$, a proportional adjustment that is the same in all states and cities.

[4] This calculation ignores feedback effects because, in turn, the federal corporate income tax will allow deductibility of net taxes paid to the state, after allowing for all incentives. This is ignored because it would be complex to allow for, and the interaction effect will be minor, as it depends on the effective federal rate of 12.6 percent, multiplied by an effective net state rate which is likely to be even lower after considering all state incentives.

APPENDIX B: SOME RESULTS ON FORMULA APPORTIONMENT

After this new firm is located in a state, the formula for the percentage of its national taxes that are apportioned to this state is

(1) $F = P \times S_e + P \times S_I + X_t \times S_c$.

F is the proportion of the firm's total national profits that are apportioned to this state. P is the proportion of the firm's total payroll located in the state. It is assumed equal to the proportion of the firm's total property that is located in the state. X_t is the proportion of the firm's total sales that are apportioned to this state. S_e, S_I, and S_c are the weights in the state's profit apportionment formula on the shares of payroll, property, and sales in the state.

The weights in the apportionment formula must sum to 1, or

(2) $S_e + S_I + S_c = 1$.

All other states with which the firm has "taxable nexus" (that is, has some property or payroll) also have an apportionment formula. After the firm has located in the new state, this apportionment formula is given by

(3) $F^o = P^o \times S_e^o + P^o \times S_I^o + X_t^o \times S_c^o$.

Here, the "o" superscript indicates these variables are for "all other taxable nexus states."

The weights in the "all other taxable nexus states" formula apportionment also must sum to 1:

(4) $S_e^o + S_I^o + S_c^o = 1$.

The firm's property and payroll after the new-firm location decision are solely located in this state, and all other taxable nexus states. Therefore, it follows that

(5) $P + P^o = 1$.

On the other hand, the sales of the firm are to this state, all other taxable nexus states, and all other nontaxable nexus states, or

(6) $X + X^o + X^n = 1$.

X, X^o, and X^n are the proportions of the firm's sales that are made in this state, all other taxable nexus states, and all nontaxable nexus states.

The proportion of sales allocated to this state is given by

(7) $X_t = X + RPX^n$.

Here, R is a dummy for whether the state uses "throwback." If the state does use throwback, then $R = 1$. In that case, the proportion of sales in this state is increased by throwing back sales to nontaxable nexus states to the state in which those goods and services were produced. We assume this is the same as allocating by the payroll or property proportions. If the state does not use throwback, then $R = 0$, and the proportion of sales used in the apportionment formula is simply the proportion of sales made in this state.

A similar formula holds after the new firm's location for other states in which the firm has a taxable nexus:

(8) $X_t^o = X^o + R^o P^o X^n$.

Before new firm location, the apportionment formula for these other states was different. It was

(9) $F^{ob} = S_e^o + S_I^o + X_t^{ob} \times S_c^o$.

The proportion of property and payroll in all other states before the new firm was 1. The proportion of sales allocated to this state was given by

(10) $X_t^{ob} = X^o + R^o \times (X^n + X)$.

That is, the throwback rule, if it existed in these other states, allocated sales from both this state and the consistently nontaxable nexus states.

We assume that profits obtained from each state are proportional to the post-new-firm allocation of payroll and property:

(11) $\pi = \text{MP}$, and

(12) $\pi^o = \text{MP}^o$

Before the new firm opened in this state, the firm's state taxes paid were given by

(13) $T^{Ob} = t^o \times \pi^o \times F^{ob}$.

T^{Ob} is the total tax revenue collected from the corporate income tax in these other states before the new plant location decision, and t^o is the corporate income tax rate in these other states.

After the new plant location decision, the firm now pays corporate income taxes in this state and in the other states in which it has taxable nexus. The tax paid in these other states is given by

(14) $T^o = t^o \times (\pi + \pi^o) \times F^o$.

Here, T^o simply gives the tax revenue collected from the corporate income tax in these other states after the new firm has located in this state, and it is simply equal to the tax rate times the profits of the firm from this plant and all other facilities, times the apportionment share given by the after formula.

The firm also pays tax in this state, given by

(15) $T = t \times (\pi + \pi^o) \times F$.

Here, *T* is total tax revenue from the corporate income tax collected in this state and is simply equal to the state's tax rate *t* times combined profits times the formula used to apportion profits.

The change in taxes due to this new branch plant in this state is given by

(16) $\Delta\text{Taxes} = T + T^o - T^{ob}$;

(17) $\Delta\text{Taxes} = t \times (\pi + \pi^o) \times F + t^o \times (\pi + \pi^o) \times F^o - t^o \times \pi^o \times F^{ob}$.

This can be rewritten as

(18) $\Delta\text{Taxes} = t \times \pi \times (F + F^o) + (t - t^o)(\pi^o \times F - \pi \times F^o) + t^o \times \pi^o (F + F^o - F^{ob})$.

Suppose initially that there is completely effective throwback. Then $F^{ob} = 1$. Suppose further that this state and other states use a similar apportionment formula. Then $F + F^o$ will sum to 1. Under these assumptions, the last term cancels out.

Suppose that this new state has similar tax rates *t* to the tax rates t^o in the other states in which the firm has a taxable nexus. Then the second term is zero.

Finally, under these assumptions, the first term is just $(t \times \pi)$. The marginal taxes associated with this new plant are simply equal to the corporate tax rate in this state times the profits in this state.

If the apportionment formulas in this state and other states are close to the payroll/property share in each state, we don't even need the taxes in the states to be similar. Apportionment formulas will be close to the payroll/property share if any one of the following conditions holds:

- The sales factor is small;
- The relative sales between this state and other states are close to the relative payroll and property shares—which might hold, for example, if the firm tends to locate its plants in more populous states;
- The sales in this state and other states are small relative to sales in nontaxable nexus states, which results in these sales being thrown back based on the property factor.

In any event, if $F = P$, and $F^o = P^o$, then the second parentheses in Equation (18) can be rewritten as

(19) $\pi^o \times F - \pi \times F^o = \pi^o \times P - \pi \times P^o$.

And, substituting in the assumption that profits are proportional to property in each state (Equations 11 and 12), we get

(20) $\pi^o \times F - \pi \times F^o = M \times P^o \times P - M \times P \times P^o = 0$.

Therefore, under those assumptions, marginal taxes on the new plant reduce to the taxes levied by this state on the plant, regardless of the relative tax rates in this state versus other states.

What about if there is no throwback rule? Let's consider the extreme case where there is no throwback rule in any state, and all states use a 100 percent sales factor for formula apportionment. Then Equation (18) can be rewritten as

(21) $\Delta\text{Taxes} = t \times \pi \times (X + X^o) + (t - t^o)(\pi^o \times X - \pi \times X^o) + t^o \times \pi^o(X + X^o - X^o)$.

The second term is then close to zero if the tax rate *t* in this state is similar to the tax rate t^o in other states. The first term is the effective tax rate in this state, adjusted downward for the proportion of "nowhere income." [$(X + X^o)$ is equal to $(1 - X^n)$, where X^n is the proportion of sales in states with no taxable nexus.] The third term is the extra tax due because locating in this new state reduces the proportion of nowhere income. If the proportion of sales in this new state is small compared to the proportion of production and profits, then this last term is small compared to the first term.

For example, suppose that tax rates are 10 percent in both states, that profits and production in this new state are 10 percent of profits and production in all other states, that sales in this new state are 1 percent of total national sales, and that nowhere sales and income are 10 percent of total sales. Then Equation (21) can be rewritten as

(22) $\Delta\text{Taxes} = 0.10 \times \pi \times 0.90 + \text{zero for second term} + 0.10 \times (9 \times \pi) \times (0.01) =$

$0.09 \times \pi + 0.009 \times \pi$.

Therefore, the third term only adds 10 percent to the first term. As a result, under these circumstances, it is largely possible to still write profits as a function of this state's effective tax rate on corporate income, after adjusting for nowhere income.

As mentioned in the main text of this paper, in the real world, shifting to a greater weight on sales factor apportionment, even without eliminating the throwback rule, seems to result in less state corporate income tax revenue. This can be seen as reductions in revenue due, in Equation (18), to corporations exploiting differences in formula apportionment across states, and ambiguities about where sales occur, to reduce effective tax rates in this state below what would be predicted based on the apportionment formula. Eliminating throwback rules then results in a further loss, equal to the average amount of nowhere income.

APPENDIX C: THE SIXTEEN EXCLUDED INDUSTRIES

As mentioned in the main text, the 2011 Bureau of Economic Analysis (BEA) database that is used in conjunction with 2011 IRS data to create industry balance sheets allows for calculation of balance sheet information for 61 industries. Sixteen of those industries, comprising almost 25 percent of value-added but less than 10 percent of employment and wages, are excluded from the main text's calculations.

As also mentioned in the main text, these 16 industries were principally excluded because either their tax or incentive data were felt to be unreliable, or the industry was strongly location-tied despite being an export-base industry. Table C1 presents incentive and tax statistics for the 16 excluded industries. As shown in that table, a number of these industries have implausibly high ratios of gross taxes to value-added based on combining their balance sheet information with normal state and local business taxes. These include many industries in transportation, funds and trusts, oil and gas, and agriculture. For many of these industries, the state and local business tax system may have special business tax rules, which are not at present incorporated in the model. Therefore, these industries are excluded.

Some industries have more realistic ratios, but I decided to exclude all mining, agriculture, and transportation industries as industries that 1) are not particularly footloose and therefore are unlikely to be good economic development targets, and 2) frequently have special tax rules or incentive rules that are not reflected in the model. Finally, for motion pictures, the database at present does not include film incentives, so this industry also is dropped.

Table C1 Incentive Results for 16 Excluded Industries

Industry	Export-base	Incentives/ value-added (%)	Gross taxes/ value-added (%)	Net taxes/ value-added (%)
Rail transportation	1	4.89	34.09	29.20
Real estate	0	1.56	32.12	30.56
Pipeline transportation	1	3.54	25.55	22.01
Utilities	1	2.95	22.84	19.89
Funds, trusts, and other financial vehicles	1	2.92	19.49	16.57
Water transportation	1	1.21	17.99	16.78
Oil and gas extraction	1	2.78	17.45	14.68
Air transportation	1	1.39	13.84	12.45
Agricultural production	1	1.51	12.06	10.56
Truck transportation	1	1.15	8.64	7.49
Support activities for mining	1	1.53	7.45	5.93
Transit and ground passenger transportation	1	1.53	7.37	5.84
Mining, except oil and gas	1	1.08	6.53	5.45
Forestry, fishing and related activities	1	1.50	5.88	4.38
Other transportation and support activities	1	1.30	5.55	4.25
Motion picture and sound recording industries	1	0.62	2.49	1.87

NOTE: These are 16 industries for which data were originally collected, but which are excluded from the main text's analysis. The ratios reported are ratios of the present value of incentives or taxes to the present value of value-added for the industry. The ratios are states as percentages of value-added.
SOURCE: Author's calculations.

Table C2 illustrates some of the unusual balance sheet ratios in 2 of the 16 excluded industries: 1) funds and trusts and 2) real estate. For example, in these two industries, the ratio of property per full-time-equivalent (FTE) worker is extremely high. Without incorporating special tax rules, these balance sheet oddities result in very high ratios of gross business taxes to value-added.

Table C2 Descriptions of Two Industries: Funds and Trusts, Real Estate

	Funds and trusts	Real estate
Value-added/gross output (%)	38.4	75.3
Compensation/value-added (%)	36.4	4.3
Wages/compensation (%)	57.2	86.3
Intermediate inputs/gross output (%)	61.6	24.7
Energy/intermediate inputs (%)	0.0	13.5
Materials/intermediate inputs (%)	0.3	4.6
Services/intermediate inputs (%)	99.7	81.9
Profits/gross output (%)	2.4	7.0
Profits/value-added (%)	6.4	9.3
Profits/property (%)	1.1	0.9
Property/value-added (ratio)	5.77	10.09
Real property/total property (%)	96.9	99.5
Land/real property (%)	0.2	9.3
Structures/real property (%)	99.8	90.7
Personal property/total property (%)	3.1	0.5
Inventories/personal property (%)	0.0	4.0
Non-inv personal/personal property (%)	100.0	96.0
Deprec structure/value (%)	2.6	2.3
Deprec machinery/value (%)	13.9	16.4
Value-added/FTE ($)	529,373	1,395,400
Compensation/FTE ($)	192,446	59,552
Wages/FTE ($)	110,024	51,403
R&D/output (%)	0.1	0.0
R&D/FTE ($)	1,554	316
Property/FTE ($)	3,052,187	14,083,359
Mach&equip/FTE ($)	95,181	65,601
Profits/FTE ($)	33,754	130,289
Industry share of total private value-added (%)	0.33	13.72

NOTE: These ratios are calculated by combining 2011 data from BEA with 2011 data from the IRS statistics of income. FTE is the number of full-time-equivalent workers in the industry.
SOURCE: Author's calculations.

APPENDIX D: EFFECT OF ALTERING INDUSTRY PROFITABILITY ASSUMPTIONS

As mentioned in the text, one might question the profitability assumptions made in the database and wonder how these assumptions affect the incentive calculations for different industries. The database takes IRS profitability information for corporations making profits in one particular year, and for each industry it blows these up to industry totals using the ratio of that industry's BEA gross output to that industry's IRS gross receipts. Obviously there are many assumptions being made here. One might wonder whether the incentive variation across industries might be sensitive to these assumptions. If profits are higher, incentives will tend to be greater. With higher profits, corporate income tax collections will be higher. With higher corporate income-tax collections, nonrefundable tax credits can be taken more fully without utilizing carry-forwards.

In this appendix, taxes and incentives for different industries are calculated using alternative profit assumptions. Specifically, we assume that all industries have the same ratio of profits to value-added. The assumed same ratio of profits to value-added is the maximum observed among the 45 industries. This maximum ratio is 35.8 percent of value-added, which is observed for both management of companies (an export-base industry), and credit intermediation (a non-export-base industry).

This uniform industry profit rate represents a significant increase for many industries. Among the 31 export-base industries, the mean ratio of profits to value-added is 24.4 percent (see Table 2 of text). Therefore, on average this alternative profit rate assumption is increasing profits among export-base industries by almost one-half. This in turn will increase the opportunities to more fully claim credits by almost one-half. Among export-base industries, the

minimum calculated ratio of profits to value-added is for insurance carriers, at 14.8 percent of value-added. For this industry, the alternative profit rate assumption is increasing profits by about two-and-a-half times.

As shown in Table D1, for the 31 export-base industries, this uniform high profit rate assumption does, as expected, increase gross taxes, incentives, and net taxes. However, the increase in incentives is surprisingly modest. The unweighted industry mean goes up by less than 5 percent, from 1.63 percent of value-added to 1.71 percent of value-added.

Furthermore, the new incentive and tax numbers are highly correlated with the old numbers. In particular, the pattern of incentives across different industries is extremely highly correlated with the original database pattern. As shown in Table D2, which shows the industry correlation matrix for the old and new tax and incentive measures, the correlation of the old and new incentive to the value-added ratio, using 2015 figures for the 31 export-base industries, is 0.996.

The bottom line is that the pattern of incentives across industries is not extraordinarily sensitive to reasonable variation in profit assumptions. Obviously the pattern would be sensitive to cases where a firm had zero profits. But it is more reasonable to assume that firms making location decisions on average both expect to and actually do make some reasonable profit rate. If so, the incentives predicted using this database's profit assumptions will be close to the incentives actually received.

Table D1 Descriptive Statistics for Incentives and Taxes across 31 Export-Base Industries, Baseline and Alternative Profitability Assumptions

Variable	*N*	Mean	Std. Dev.	Min	p10	p25	p50	p75	p90	Max
Baseline gross taxes/value-added	31	5.03	2.07	2.24	3.29	3.73	4.34	6.07	7.68	10.70
Baseline incentive/value-added	31	1.63	0.42	0.68	1.11	1.41	1.60	1.84	2.22	2.66
Baseline net taxes/value-added	31	3.40	1.90	0.94	1.75	2.09	2.82	4.25	5.66	9.12
Alternative gross taxes/value-added	31	5.55	2.10	3.00	3.78	4.11	4.85	6.17	8.15	11.40
Alternative incentives/value-added	31	1.71	0.45	0.69	1.20	1.44	1.67	1.93	2.34	2.81
Alternative net taxes/value-added	31	3.84	1.91	1.62	2.23	2.57	3.40	4.62	6.00	9.73

NOTE: Table shows descriptive statistics for ratio of present value of taxes or incentives to present value of value-added stated in percentage terms. The descriptive statistics are for a facility starting up in 2015, and are national averages for each of 31 export-base industries. The calculations are made under two profitability assumptions. The baseline assumptions use the IRS-to-BEA conversions outlined in the text for each industry. The alternative assumptions use the same uniformly high ratio of profits to value-added for each of the 31 industries.
SOURCE: Author's calculations.

Table D2 Correlations across Industries of Tax and Incentive Calculations under Alternative Profitability Assumptions

	Baseline gross taxes/ value-added	Baseline incentive/ value-added	Baseline net taxes/ value-added	Alternative gross taxes/value-added	Alternative incentives/ value-added	Alternative net taxes/value-added
Baseline gross taxes/ value-added	1					
CI LB	1					
CI UB	1					
Baseline incentive/ value-added	0.4964	1				
CI LB	0.1723	1				
CI UB	0.7235	1				
Baseline net taxes/value-added	0.9814	0.3204	1			
CI LB	0.9613	−0.0383	1			
CI UB	0.9911	0.6059	1			
Alternative gross taxes/ value-added	0.9937	0.5125	0.9710	1		
CI LB	0.9869	0.1933	0.9400	1		
CI UB	0.9970	0.7336	0.9860	1		
Alternative incentives/ value-added	0.4884	0.9964	0.3124	0.5131	1	
CI LB	0.1621	0.9924	−0.0471	0.1940	1	
CI UB	0.7184	0.9983	0.6003	0.7340	1	
Alternative net taxes/ value-added	0.9786	0.3308	0.9946	0.9797	0.3305	1
CI LB	0.9556	−0.0267	0.9888	0.9579	−0.0270	1
CI UB	0.9897	0.6132	0.9974	0.9903	0.6131	1

NOTE: This table reports the correlation matrix, for 2015, across 31 export-base industries, of tax and incentive to value-added ratios, using baseline and alternative profitability measures for industries. In addition to reporting the correlation, the matrix reports the 95 confidence interval lower bound (CI LB) and upper bound (CI UB) for each estimated correlation.
SOURCE: Author's calculations

APPENDIX E: COMPARISON WITH OTHER STUDIES

This appendix compares this database's results with other research that has tried to quantify state and local incentives or business taxes. Comparisons are done to the following other studies:

- The model by Alan Peters and Peter Fisher (2002) of state and local incentives and taxes for manufacturing industries in 1990 and 1998.
- The model by the Tax Foundation and KPMG (2012, 2015) of state and local net taxes, after incentives, in 2011 and 2014, for seven specific industries.
- Estimates by Ernst and Young (Cline, Phillips, and Newbig 2011) of weighted average for various industries (most weight on manufacturing) of gross state and local business taxes on new investment, as of 2009.
- Estimates by Ernst and Young for average overall business taxes as a percentage of value-added, for 2003 and 2014 (Cline et al. 2004; Phillips et al. 2015).
- Estimates by Ernst and Young of the division of state and local business taxes by type of tax in 2014.
- Estimates by Good Jobs First of "Megadeals," with incentive costs exceeding a total over all years of the facility of $75 million per firm, for each year from 1990 to 2015.

What should reasonably be expected from these comparisons? Given that the different studies use different methodologies and data and are not trying to measure exactly the same incentive and tax concepts, we would not expect these other studies to perfectly agree, either between themselves or with the current database. However, given that the studies and the current database are seeking to measure incentive and tax concepts that are related, one would hope that in most cases the estimates are at least somewhat positively correlated. Where the estimates differ from the current database, many of these differences do not necessarily mean that one

estimate is wrong and the other is right, because the studies are not necessarily seeking to measure exactly the same concept.

Overall, the below-presented comparisons do show the expected positive correlations. In particular, the pattern of incentives or net taxes across different states in these other studies, and in the current study, tend to show positive correlations, which are often significant even with the limited number of states available for comparison.

Peters/Fisher

This database's approach is similar to the approach previously used in two books by Alan Peters and Peter Fisher (Fisher and Peters 1998; Peters and Fisher 2002). (Their approach, in turn, builds on earlier work—for example research by Leslie Papke [1987].) The commonality is that both use a hypothetical firm approach. In both this database and in the Peters/Fisher work, the impact of incentives and taxes is measured by using data on how a new facility's balance sheet will be affected by state and local business taxes and incentives.

For comparison with our studies, we consider the average results reported for manufacturing in Peters and Fisher (2002) for 1990 and 1998. We compare their results with the average results in our database for manufacturing for the same years. We compare results for the 19 states for which we have overlapping results. Specifically, we focus on the correlation across the 19 states between the gross tax rates, incentive rates, and net tax rates in the Peters/Fisher model versus the current database.

Before looking at the results, there are some differences (and some similarities) between our models that should be mentioned, including the following:

- The Peters/Fisher model estimates gross tax rates, incentive rates, and net tax rates as a percentage change in the rate of return or profit rate; the current database estimates gross tax rates, incentive rates, and net tax rates as a percentage of value-added.

- Peters and Fisher calculate the manufacturing average by weighting different industries by employment; the current database calculates weighted averages using value-added by industry weights.
- Both models examine the tax rates and incentive rates applying to a new facility over a 20-year period.
- The Peters/Fisher model uses a 10 percent real discount rate; the current database uses a 12 percent real discount rate.
- Peters and Fisher do not appear to account for discretionary credits, which the current database tries to include if they are common enough and can be described by some rule explaining their likely value to a hypothetical firm.
- Peters and Fisher do not include R&D tax credits or customized job training subsidies.
- Both models assume sufficient replacement investment that the firm has the same scale of operations over the entire 20-year period.

Table E1 shows the results. As the table shows, the gross tax correlations all have the expected positive sign but are statistically insignificant. This is not too surprising, as there are only 19 observations when we look at just one of the years. In contrast, the incentive correlations are statistically significant for both years pooled together, for 1998 separately, and for the difference between 1990 and 1998. The incentive correlation for 1990 by itself is positive but statistically insignificant. For the 1990s, the Peters/Fisher model and the current database appear to yield considerable agreement on which states increased incentives the most, and on where they ended up in incentive levels toward the end of the 1990s. By 1998, the models appear to agree that high-incentive states included Indiana, Kentucky, Michigan, New York, and Iowa. In addition, as of 1998, the models agree that low-incentive states included Minnesota, Tennessee, Texas, Virginia, and Wisconsin. On the other hand, the models disagree about the incentive levels in Connecticut, Florida, Illinois, Iowa, and Pennsylvania.

Table E1 Comparison of Peters/Fisher Model with the Current Database

	1998				1990			
	Gross tax rate		Incentives		Gross tax rate		Incentives	
	Peters/Fisher	This paper	Peters/Fisher	This paper	Peters/Fisher	This paper	Peters/Fisher	This paper
California	9.00	4.72	1.00	1.00	9.30	4.59	0.00	0.46
Connecticut	8.10	7.27	0.90	2.35	9.50	8.10	0.00	1.86
Florida	7.60	5.70	0.00	1.09	8.00	4.40	0.00	0.00
Illinois	5.50	4.42	0.40	1.30	5.90	4.79	0.40	0.77
Indiana	13.60	5.12	2.80	2.60	13.80	5.47	0.00	1.77
Iowa	2.90	5.11	0.90	2.72	5.30	5.68	1.30	0.77
Kentucky	8.00	3.09	3.50	2.67	7.70	3.09	1.00	0.22
Massachusetts	7.10	4.11	1.10	0.82	7.80	4.52	0.40	0.14
Michigan	7.50	6.04	2.10	2.71	10.00	6.76	2.00	1.79
Minnesota	8.10	5.10	0.50	0.16	9.20	6.67	1.30	0.16
New York	6.10	4.61	2.70	1.93	6.30	5.03	2.50	1.97
North Carolina	7.00	4.37	1.10	0.56	7.10	3.61	1.10	0.03
Ohio	10.00	5.32	2.20	1.72	10.60	5.18	0.10	0.86
Pennsylvania	9.30	4.96	2.00	0.36	8.90	4.74	0.70	0.05
South Carolina	8.40	5.66	7.60	2.98	8.90	5.60	3.40	0.56
Tennessee	7.80	3.76	0.70	0.12	8.10	4.16	0.20	0.05
Texas	10.40	5.45	0.80	0.63	11.40	4.55	0.80	0.69
Virginia	7.10	2.92	0.10	0.28	7.10	2.89	0.00	0.04
Wisconsin	6.10	4.54	0.00	0.24	6.00	5.21	0.00	0.24
Correlation		0.186		**0.641**		0.283		0.247
Combined correlation for both years		0.243		**0.580**				
Correlation of differences between two years		0.367		**0.600**				

NOTE: This table reports Peters/Fisher gross tax rate and implied incentive rate from their Table 3.3 on pages 62–63 of Peters and Fisher (2002). The incentive rate is the difference between the effective tax rate after basic taxes and the effective tax rate after general incentives. Bolded correlations signify statistical significance at a 95 percent level. The gross tax and incentive rates reported here are manufacturing averages for these 19 states for the respective years. The rates for Peters/Fisher are effective tax rates as a percentage of profits. The rates for this database are tax rates as a percentage of value-added.
SOURCE: Author's calculations and Peters and Fisher (2002).

Tax Foundation/KPMG

The Tax Foundation and KPMG, an auditing firm based in the Netherlands, have calculated net tax rates for "new firms" and "mature firms" in seven industries, for each of the states, for two years: 2011 and 2014 (Tax Foundation and KPMG 2012, 2015). They report net tax rates on profits after incentives. From reading their modeling description, their "new firm" tax rates appear to apply to the first year of operation. Therefore, in doing comparisons with the current database, this appendix compares their "new firm" tax rates with the current database's net tax rate in Year 1 of the new facility's operation. This appendix then compares their "mature firm" tax rates with the current database's net tax rate in Year 11 of the new facility operation.

The Tax Foundation/KPMG model and the current database appear to include a similar set of business taxes and incentives. The TF/KPMG model includes unemployment insurance taxes, which are excluded from the current database because I do not regard these taxes as net taxes on business, given their benefits to workers. The TF/KPMG model does not include customized job training incentives, which are included in the current database. The TF/KPMG model also does not include deal-closing incentives, which are included in the current database if they are commonly used and if some information can be found on what rules govern their operation.

Perhaps the biggest obvious difference between the TF/KPMG model and the current database is the treatment of formula apportionment for the corporate income tax. As described in the text and in Appendix B, in this database, it is assumed that increasing the sale factor and eliminating throwback may lower corporate income taxes, but not by as much as is implied by simply assuming that most of an export-base firm's income is untaxed. In contrast, the TF/KPMG model appears to assume that if a firm is in certain export-base industries, and only *x*

percent of the U.S. population is in the state, that $(1 - x)$ percent of the firm's profits are essentially untaxed by the state's corporate income tax. These assumptions about formula apportionment, in addition to affecting corporate income tax rates, will affect what incentives can be taken in a given year against the corporate income tax. In addition, the TF/KPMG model makes an unusual assumption about corporate headquarters—that 100 percent of its sales occur in-state. In contrast, this database's model assumes that, for export-base firms, 10 percent of sales are in-state and 90 percent out-of-state, whereas for non-export-base firms, 100 percent of sales are in-state.

Table E2 shows the results: 20 out of the 28 correlations are positive, 8 negative. Nine out of the 28 correlations are statistically significantly different from zero at the 95 percent level, and all of these are positive. Overall, the results suggest that the current database and the Tax Foundation/KPMG estimates at least point to roughly similar spatial patterns of incentives, although with many exceptions.

Table E2 Correlations by Type of Firm of Tax Foundation/KPMG Measures of Net Taxes after Incentives with This Database's Measure

		Correlations by year and type of firm			
		2014		2011	
		New firms	Mature firms	New firms	Mature firms
export-base	Truck/bus manufacturing	**0.352**	−0.207	0.297	−0.160
	Steel manufacturing	0.310	0.042	0.274	0.053
	Corp headquarters	**0.366**	**0.712**	0.285	**0.573**
	Pharm R&D	**0.436**	−0.082	0.255	−0.080
	Warehousing	−0.138	**0.421**	0.041	**0.496**
non-export-base	Call center	−0.146	0.086	−0.187	0.099
	Retail clothing store	0.143	**0.673**	−0.173	**0.558**

NOTE: Bolded correlations are statistically significant at 95% level. Correlations are calculated over 33 state observations that overlap. Correlation is between the TF/KPMG model's net tax rate on profits and this study's net tax rate as percentage of value-added.
SOURCE: Author's calculations and Tax Foundation/KPMG (2012, 2015).

Ernst and Young: Marginal Gross Tax Rates on New Investment

Ernst and Young (Cline, Phillips, and Newbig 2011) calculate, as of 2009, for each of the 50 states plus the District of Columbia (DC), the effective state and local gross tax rate on new investment in a new facility or an expanded facility for a "hypothetical firm" in five different industries. The reported results by state aggregate these results using various weights up to an overall average for each state. For the comparisons done with the current database, this appendix uses the results weighted by capital expenditures, which put 40 percent of the weight on durable manufacturing and 42 percent on nondurable manufacturing (Table 1 and Table 2, Cline, Phillips, and Newbig 2011). The Ernst and Young results are for taxes only and do not consider incentives, so the appropriate comparison is with the current database's results for gross business tax rates.

The Ernst and Young results are similar to the current database in what taxes are considered: corporate income taxes, sales taxes on business inputs (including gross receipts taxes), and property taxes. The Ernst and Young model considers a 30-year period after the new or expanded facility begins operation, whereas the current database model considers a 20-year period. For both models, sufficient replacement investment is assumed that the scale of operations of the new or expanded facility remains the same for the entire period. The Ernst and Young calculates the tax rate as the difference in the rate of return to the new facility due to taxes; the current database calculates the tax rate as the ratio of the present value of state and local business taxes to the present value of value-added, using a 12 percent real discount rate.

Perhaps the major difference between the two models is formula apportionment: the Ernst and Young model appears to assume that for export-base firms, a high sales factor results in very little of the firm's profits on the new facility being apportioned to the state, and therefore taxed.

As explained in this paper's text and in Appendix B, this assumption is not necessarily correct, as profits elsewhere may be apportioned to the state because of the new or expanded facility. Therefore, the current database's model does incorporate some reduction in effective tax rates due to increasing the sales factor in formula apportionment, but not as great as in the Ernst and Young model.

Table E3 compares the current database's results with the Ernst and Young model's results for the 33 states that overlap. As can be seen, the correlation between the two sets of results is positive and large and statistically significant at 0.704. In addition, the models agree in many cases on what states had high or low gross state and local business taxes in 2009. For example, both models agree that New Mexico, and Louisiana, and DC were the highest-gross business tax states. On states with low taxes, the models agree that as of 2009, Ohio, Oregon, Virginia, and Wisconsin were among the lowest-gross business tax states. On the other hand, the models also show some disagreement, sometimes dramatic. For example, in the Ernst and Young model, Tennessee as of 2009 is a very high business tax state, which is not true in our database. The current database says that in 2009 Nevada was a low business tax state, which is not true in the Ernst and Young model.

Ernst and Young: Estimates of Average Business Tax Rate, 2003 and 2014

Ernst and Young also do an annual report for the Council on State Taxation that attempts to measure the overall state and local business tax burden on all businesses in each of the 50 states plus the District of Columbia. For comparisons with the current database, we pick the earliest and latest of these reports, from 2003 and 2014 (Cline et al. 2004; Phillips et al. 2015). This allows us to look at changes over the lengthiest possible period.

Table E3 Comparison of This Paper's Gross Tax Rates with Ernst and Young's Marginal Tax Rates on New Investment

State	This paper's database (%)	Ernst and Young marginal tax rate on new investment (%)
Alabama	4.31	9.70
Arizona	4.32	9.30
California	4.37	7.70
Colorado	3.33	6.80
Connecticut	4.29	8.90
District of Columbia	5.74	16.60
Florida	4.60	7.40
Georgia	3.82	6.60
Illinois	3.68	4.60
Indiana	4.98	6.80
Iowa	4.81	6.40
Kentucky	3.15	6.50
Louisiana	5.96	11.10
Maryland	3.52	6.30
Massachusetts	3.54	8.20
Michigan	5.40	7.20
Minnesota	4.83	6.00
Missouri	4.41	7.10
Nebraska	4.14	9.40
Nevada	2.90	8.20
New Jersey	3.78	7.50
New Mexico	7.18	16.60
New York	4.08	7.10
North Carolina	4.16	8.60
Ohio	2.82	4.40
Oregon	3.25	3.80
Pennsylvania	4.78	7.10
South Carolina	5.53	8.90
Tennessee	4.55	10.30
Texas	4.43	6.90
Virginia	2.21	5.40
Washington	3.87	9.40
Wisconsin	3.37	4.50
Correlation across columns	**0.704**	

NOTE: The Ernst and Young results are from the first column of numbers in Table 2 (Cline, Phillips, and Newbig 2011). This database's numbers are weighted numbers using the Ernst and Young industry weights from their Table 1 for capital investment. The Ernst and Young tax rates are the percentage reduction in the rate of return due to taxes. This database's tax rates are the present value of gross taxes divided by the present value of value-added.
SOURCE: Author's calculations and Cline, Phillips, and Newbig (2011).

This annual Ernst and Young report uses a quite different methodology from the hypothetical firm method. Essentially it takes different types of state and local tax revenues, and it uses various allocation assumptions to determine what proportion on average is paid by business in each state. These allocated business tax payments are then divided by various

denominators to yield business tax rates. For the comparison, I use their business taxes divided by private sector value-added, which is similar to this database's value-added.

Because of how the Ernst and Young reports are done, the tax base is an average gross business tax rate. It does not necessarily reflect the tax rate on new investment, but rather the average of firms across all ages. Therefore, for the comparisons, using this paper's database, we take all 45 industries, both export-base and non-export-base, and attempt to calculate an average tax rate as a percentage of value-added with some assumed age allocation of firms. We use a similar method of allocation to what was used in Table 21 of the main text, except we assume an age allocation based on an assumption that overall private-sector GSP grows by 2.232 percent per year, with new investment depreciating by 2.491 percent per year. These figures are based on average private-sector gross state product growth in the United States from 1997 to 2014, according to the BEA, and on the average depreciation rate of structures, according to the BEA.

Ernst and Young's reports include more business payments of taxes than the current database. The current database's model only includes the property tax, the sales tax on business inputs, and property taxes. According to Ernst and Young, in 2014, these three taxes were 66.5 percent of overall state and local business taxes. However, the Ernst and Young figures include unemployment insurance taxes, which may not be a business tax.

Table E4 reports the results. For 2003, 2014, and the difference between the two years, the Ernst and Young results are positively correlated with the current database's results, with the correlation being statistically significant for the 2003 comparison and the 2003-to-2014 change in business taxes. These correlations are moderately high. In some specific cases, the models agree. For example, both models agree that Michigan from 2003 to 2014 had a large reduction in average business taxes, while New Mexico had a large increase in average business taxes. But in

Table E4 Comparisons of Average Gross Business Tax Rates, Ernst and Young versus This Database

	Gross tax rate 2014 (%)		Gross tax rate 2003 (%)		Change in gross tax rate 2014–2003 (%)	
state	This database	Ernst & Young	This database	Ernst & Young	This database	Ernst & Young
Alabama	3.74	4.50	4.04	4.40	0.30	−0.10
Arizona	6.06	5.30	5.23	4.90	−0.82	−0.40
California	3.93	4.40	4.08	4.40	0.14	0.00
Colorado	3.70	4.00	4.40	4.30	0.69	0.30
Connecticut	6.23	4.30	6.08	3.40	−0.16	−0.90
District of Columbia	5.47	0.00	5.11	4.80	−0.37	0.00
Florida	4.95	5.40	4.34	5.20	−0.61	−0.20
Georgia	3.89	4.00	4.00	3.80	0.11	−0.20
Illinois	5.24	5.30	5.42	5.00	0.18	−0.30
Indiana	4.80	4.10	4.36	3.70	−0.44	−0.40
Iowa	5.45	5.00	6.04	4.50	0.59	−0.50
Kentucky	3.65	4.70	3.42	4.70	−0.23	0.00
Louisiana	5.52	5.80	5.10	4.00	−0.42	−1.80
Maryland	5.10	4.30	5.37	3.80	0.27	−0.50
Massachusetts	4.92	3.90	4.90	4.10	−0.01	0.20
Michigan	6.20	5.30	5.55	3.70	−0.65	−1.60
Minnesota	5.12	4.60	5.83	4.60	0.71	0.00
Missouri	4.75	4.10	4.87	3.50	0.12	−0.60
Nebraska	4.84	5.20	4.79	4.30	−0.05	−0.90
Nevada	2.43	4.70	2.58	5.40	0.14	0.70
New Jersey	4.58	5.10	4.32	5.10	−0.25	0.00
New Mexico	6.93	5.90	7.74	7.00	0.81	1.10
New York	5.71	5.60	5.08	5.70	−0.63	0.10
North Carolina	3.56	3.70	3.52	3.50	−0.04	−0.20
Ohio	4.81	4.70	3.82	4.10	−0.99	−0.60
Oregon	3.46	3.40	3.76	3.40	0.30	0.00
Pennsylvania	4.74	4.70	5.67	4.50	0.92	−0.20
South Carolina	4.72	4.50	5.41	4.90	0.68	0.40
Tennessee	5.40	4.50	5.95	4.20	0.56	−0.30
Texas	5.39	5.10	4.95	4.90	−0.44	−0.20
Virginia	3.58	3.90	2.96	3.80	−0.61	−0.10
Washington	4.67	6.30	4.86	5.40	0.19	−0.90
Wisconsin	5.34	4.90	4.90	4.50	−0.44	−0.40
Correlation		**0.553**		0.318		**0.418**

NOTE: Ernst and Young numbers report average overall business tax rate as percentage of private value-added. This database reports overall average gross business tax rate on 45 industries, comprising 75% of value-added and over 90% of employment, as a percentage of value-added, averaged using an assumed age distribution of firms. The correlation is between the above two columns. Bolded correlations are statistically significantly different from zero at a 95% level.
SOURCE: Author's calculations, Cline et al. (2004), Phillips et al. (2015).

other cases there is disagreement. For example, the Ernst and Young model says there were large business tax reductions from 2003 to 2014 in Washington, Nebraska, and Connecticut, which are not evidenced in this database's results. Presumably these differences in part reflect the quite distinct methodologies and data sources used in these two different models.

Ernst and Young Breakdown of Types of Business Taxes

I wanted to check how similar the allocation of types of business taxes in the current database was to Ernst and Young's allocation. To make these as comparable as possible, the average taxes from this study were weighted using an assumed distribution of ages of firms. In addition, in the Ernst and Young calculations, individual income taxes were also included. Our database implicitly acts as if the corporate income tax applies to all firms. The Ernst and Young figures for business taxes include property taxes and sales taxes on business inputs paid by firms that end up having their profits taxed under the individual income tax. Therefore, to make the allocation by type of tax comparable, individual income taxes in the Ernst and Young figures need to be added in to the "income tax" category.

Table E5 reports the results. Once the adjustments are made to boost comparability, the allocation of business taxes by type of tax is remarkably similar in this database and in Ernst and Young's analysis.

Table E5 Allocation of State and Local Business Taxes by Type of Tax among Property, Sales, and Income Taxes, This Database versus Ernst and Young

	This database	Ernst and Young
Property	52.5	51.0
Sales	24.5	29.0
Income	23.0	20.0

NOTE: This database's results are for 2014 and are for export-base firms. The allocation of taxes by type of tax are based on results that weight effects in different years of an investment by an assumed allocation of firms by age of firm. Ernst and Young's results are for 2014 and come from Phillips et al. (2015). These results add individual income taxes paid by business to the corporate income tax total and divide by the three-tax-type total to get the percentages.
SOURCE: Author's calculations, Phillips et al. (2015).

On the other hand, the trends over time in this database differ from the Ernst and Young trends. Ernst and Young has some aggregate data over the entire United States for estimated state and local business taxes by type going back to the year 2000. As shown in Table E6, their analysis finds that from 2000 to 2014, property taxes and income taxes increased their share of

Table E6 Comparison of Time Trends in Type of Tax between This Database and Ernst and Young

	Ernst and Young			This database		
Share of:	2000	2014	2014–2000	2000	2014	2014–2000
Property tax	48.3	51.0	2.7	54.0	52.5	−1.5
Sales tax	33.4	29.0	–4.4	19.6	24.5	4.9
Income taxes	18.4	20.0	1.6	26.3	23.0	–3.4

NOTE: This database results are for export-base firms. The weighing looks at each age of investment, and weights those ages by an assumed age distribution of firms. The Ernst and Young results add in their business income taxed under the individual income tax to their corporate income tax figures. The 2014-2000 columns shows the difference of the 2014 column minus the 2000 column.
SOURCE: Author's calculations; Cline et al. (2004); Phillips et al. (2015).

state and local business taxes, while sales taxes decreased. In contrast, this database suggests that the share of sales taxes increased, while the shares of property taxes and income taxes decreased. The divergent income tax trends could be due in part to the growth of pass-through income taxed under the personal income tax. But the property tax and sales tax results may result from divergent assumptions and data sources.

"Good Jobs First" Megadeals

Good Jobs First has a database that reports "Megadeals." These are incentive deals whose total value (undiscounted), over the life of the project, exceeds $75 million in nominal dollars. This database is available from 1990 to the present.

I wanted to see whether the time pattern by year in the current database matched the time pattern shown in the Megadeals database. To make the two data sets more comparable, I calculated real Megadeals as a percentage of real GDP for each year from 1990 to 2015 and looked at how this compares with the incentives to value-added ratio for each year, for export-base firms, calculated in the current database.

Table E7 reports the results. First, I want to note the average level of Megadeals over this time period versus the average level of total business incentives in this database's models. Over the entire time period, when both incentives and value-added are expressed as a percentage of GDP, Megadeals are no more than 10 percent of total incentives. The true percentage might be

Table E7 Time Trends in Real Megadeal Volume Compared with Time Trends in This Database's Incentives to GDP Volume

Year	Real Megadeals as % of Real GDP	Incentive/value-added (%)
1990	0.003	0.46
1991	0.020	0.47
1992	0.004	0.52
1993	0.017	0.56
1994	0.010	0.64
1995	0.014	0.75
1996	0.009	0.82
1997	0.014	0.85
1998	0.007	0.89
1999	0.015	0.90
2000	0.032	1.01
2001	0.004	1.39
2002	0.018	1.38
2003	0.048	1.43
2004	0.028	1.50
2005	0.019	1.48
2006	0.025	1.48
2007	0.063	1.44
2008	0.025	1.42
2009	0.052	1.45
2010	0.050	1.37
2011	0.029	1.41
2012	0.040	1.40
2013	0.103	1.40
2014	0.051	1.43
2015	0.027	1.42
Average, 1990 to 2015	0.028	1.126
Average, 1990 to 2015, adjusted to GDP base	0.028	0.330
Correlation between Real Megadeal and Incentive	**0.559**	

NOTE: Real Megadeal volume taken from Good Jobs First website at http://www.goodjobsfirst.org/megadeals. Real GDP from BEA. The adjustment of incentives as a percentage of GDP is based on 2011 figures for value-added in export-base industries versus total GDP.
SOURCE: Author's calculations, Good Jobs First.

somewhat less because the Megadeal database does not apply any inflation adjustment or discounting to determine the value of Megadeals. Therefore, there is nothing that inevitably forces the time trends in Megadeals and incentives to be identical.

Second, over the entire time period, both Megadeals and the current incentives database show strong upward trends. The overall correlation of the two data series is 0.559 and is statistically significantly different from zero.

Third, it is clear that the Megadeals database does not show the same slowdown in growth in recent years that is seen in this incentives database. Although the Megadeals fluctuate up and down, and some recent years are similar to some years 10 or 15 years ago, on the whole there appears to be some increasing trend in real Megadeals as a percentage of the economy.

There could be several explanations of these divergent patterns. First, over time, Megadeals could be becoming a greater percentage of overall incentives. Second, the database may not capture some of the incentives in these Megadeals, as many of these Megadeal incentives are discretionary and handed out in an ad hoc and project-specific manner that would not be captured in the incentives database. Third, the Megadeals database may have some bias toward finding larger dollar volumes more recently, for at least two reasons: 1) the $75 million threshold is not adjusted for inflation, so more deals today would be covered, and 2) there has been some improvement in incentive reporting over time, which may allow more Megadeals to be captured and more of their value to be measured.

APPENDIX F: COMPARISON OF THIS STUDY'S INCENTIVE ESTIMATES WITH ANNUAL INCENTIVE DOLLAR ESTIMATES FROM STATE TAX EXPENDITURE STUDIES AND OTHER SOURCES

This study estimates what state and local governments are doing in incentives using a simulation model. This simulation model is based on a hypothetical firm model, as well as the rules and laws governing incentives in the state, combined with some judgment about which incentives are in fact commonly used.

This appendix compares this database's estimates with estimates of incentives from what in each state is reported, either in state tax expenditure reports, other government documents, or studies by independent groups. The aim is twofold: first, to see what either methodology implies for what might be the national total of annual resources devoted to economic development incentives; second, to see whether these two quite distinct estimation methods lead to a similar spatial pattern of incentives across states. A similar spatial pattern provides some support that both methods are reflecting reality.

Both estimates of incentives have some limitations, which might lead to either overstatement or understatement of incentives. The simulation model assumes, in essence, that each and every firm that starts up or expands in a state will receive the full array of modeled incentives. This is probably an exaggeration. On the other hand, the simulation model excludes certain important incentives, such as enterprise zones, tax increment financing, and some discretionary incentives whose rules and formulas cannot be calculated.

The estimates based on various state reports may miss some incentives that are not reported. On the other hand, for this exercise, I included enterprise zones, brownfield subsidies,

and various industry subsidies as incentives. As argued in the text, there are reasons to believe that these may not always be properly counted as incentives.

(This database did not include tax increment financing incentives (TIFs) in the reported numbers, for two reasons. First, as argued in the report's main text, in some cases TIFs may not be an incentive, but rather a way of financing local infrastructure projects. Second, as the analysis proceeded, it became clear that in many states it is virtually impossible to reliably estimate TIF annual dollar costs. As a result, including TIFs would make the estimates much less comparable across states.)

The actual reports used for each state and more details on the estimates are provided below. All reported numbers were either for 2015 or, if for other years, were adjusted as best as could be done to a projected level in 2015, given the size of the export-base industry sector in the state in 2015 versus the year or years for which reports of incentive dollar volume are available.

The simulations from this paper's database are meant to represent annual dollar resources devoted to incentives. Therefore, the incentives for each state were calculated by taking the average incentive to value-added ratio for each year of a facility's operation and then weighting these numbers by an assumed age distribution of firms by year of facility operation. This age distribution was the same national age distribution used in the main report text and is described in Table 21.

The incentive estimates based on state reports initially yield a measure of incentives for 2015 in terms of annual dollar volume by state. The incentive estimates based on this database yields a measure of incentives for 2015 in terms of a percentage of the state's export-base value-added. To allow comparisons, both sets of estimates were calculated in both dollar and percentage terms using estimates of the total value-added in export-base industries in the state.

Table F1 shows, for each state for 2015, and under both the reports estimation method and the database estimation method, estimated incentive volume, in both percentage terms and dollar terms. The dollar figures are extremely highly correlated, at 0.908. But this is partly because both methods rely on the same estimates of a state's export-base value-added. However, the incentive percentage by state, estimated by the two methods, is also very highly correlated, at 0.743. Even though the two methods of estimating incentives are very different, the implied spatial pattern of incentives is similar.

Looking at individual states, there is considerable overlap. Consider the incentive percentages. Under the database simulations, the five highest incentive states (in order from top to bottom) are New Mexico, Tennessee, New York, Louisiana, and South Carolina. Under the incentive estimates based on various reports, the five highest incentive states (in order from top to bottom) are Louisiana, New Mexico, South Carolina, New York, and Nebraska. Four out of the five top states are the same in both lists. Furthermore, Nebraska is a high-incentive state in the database simulations as well, and Tennessee is at least an above-average incentive state in the estimates based on reports.

Both sets of estimates can be used to project the total annual incentive dollar volume in the nation. The state estimates based on reports are based on only 32 states. (Alabama has no tax expenditure reports, so it is omitted.) The state estimates based on the database are available for 33 states. In either case, the value-added in export-base industry value-added in these 32 or 33 states is over 90 percent of national value-added in such industries. If we project these numbers up to the national level, the database estimates suggest that dollar resources in the nation devoted to state and local incentives in 2015 was around $45 billion. Based on the estimates from state reports, total resources in the nation devoted to state and local incentives in

Table F1 Actual Reported versus Database Simulated Annual Resources Devoted to Incentives, by State, and Projected to the Nation

State	Export-base value-added, 2015 ($M)	Incentives/value-added, from reported incentive dollars (%)	Incentives/value-added projected from this database (%)	Annual dollar resources devoted to incentives from tax expenditure reports and other reports ($M)	Annual dollar resources devoted to incentives from this database and export-base size ($M)
Alabama	59,449		1.48		879
Arizona	68,130	0.23	0.66	155	449
California	706,254	0.36	0.41	2,559	2,864
Colorado	97,206	0.03	0.40	26	390
Connecticut	93,385	0.31	0.33	289	305
District of Columbia	26,075	0.55	0.91	143	238
Florida	192,467	0.54	0.99	1,033	1,902
Georgia	144,345	0.34	0.26	484	376
Illinois	245,615	0.39	0.91	956	2,234
Indiana	133,110	0.38	1.55	507	2,069
Iowa	58,063	0.32	1.38	186	801
Kentucky	59,632	0.38	1.26	226	754
Louisiana	78,428	1.89	1.85	1,484	1,452
Maryland	87,689	0.14	0.26	119	227
Massachusetts	164,208	0.29	0.37	475	611
Michigan	164,376	0.54	1.05	883	1,721
Minnesota	106,264	0.14	0.58	146	621
Missouri	87,558	0.21	0.37	185	323
Nebraska	31,435	0.64	1.33	200	419
Nevada	39,000	0.01	0.12	4	48
New Jersey	173,932	0.24	1.64	425	2,848
New Mexico	16,968	1.66	3.01	281	511
New York	440,200	1.12	1.87	4,942	8,250
North Carolina	174,442	0.16	0.56	278	972
Ohio	196,119	0.27	0.56	526	1,105
Oregon	86,398	0.42	0.37	359	323
Pennsylvania	219,837	0.16	0.86	346	1,881
South Carolina	56,514	1.14	1.84	645	1,037
Tennessee	93,446	0.57	2.74	530	2,563
Texas	482,772	0.32	0.64	1,554	3,097
Virginia	144,772	0.10	0.12	144	173
Washington	152,751	0.08	0.05	121	74
Wisconsin	103,923	0.25	0.75	258	777
Correlation of reported w/database		**0.743**			**0.908**
Sum of 32 states	4,925,313	0.42	0.84	20,470	41,415
National total	5,328,586	0.42	0.84	22,146	44,806
32 as % of national	92.4				
Sum of 33 states	4,984,763		0.85		42,294
National total	5,328,586		0.85		45,211
33 as % of national	93.5				

NOTE: All dollar figures are in millions of 2015 dollars. The correlation is across the 32 states, and is the correlation of the percentages under each method, and dollars by state under each method. The bolding indicates these correlations are statistically significant. The export-base value-added figures come from the BEA and are value-added figures for the 31 export-base industries, projected to the year 2015 using available data through 2014. The tax expenditure reports and other reports by state are used to generate the annual dollar total for the 32 states with tax expenditure reports of some kind, as described further in the appendix text. Division then yields the percentage that incentives are of value-added of export-base industries in the state. For this database, the model is used to project the annual resources devoted to economic development under the assumption that the 2015 incentive regime is applied to an assumed distribution of facilities by age of facility. The annual dollar resources from the database are then derived by multiplying by export-base industry value-added. The national totals are calculated by assuming that the same percentages in the 32 states apply to the entire nation, and then multiplying these percentages by national value-added in export-base industries to get annual dollar figures.
SOURCE: Author's calculations, various tax expenditures, and other reports cited in appendix.

2015 were around $22 billion. I would regard the $22 billion as a minimum figure; state and local reports often omit incentives. Total incentives could be even higher than $45 billion, because the database estimation method may also omit some incentives.

Below, this appendix describes the methods used in this appendix, based on the various e reports' numbers, to generate this appendix's incentive estimates:

General Comments

For each state, this appendix tries to measure all state and local business tax incentives and business non–tax incentives for as close a year to 2015 as possible. All incentives are included, except that sales tax breaks are, in general, not included. For all incentives, this appendix tries to measure the annual cost of each incentive program. This significantly understates expected long-term costs of recently started incentive programs, or recently expanded incentive programs, that promise long-term incentives. Major examples of such possible understatements are mentioned in the below discussion. Each incentive included is then divided by actual or projected value-added for 31 export-base industries in that year, or if the number is cumulated over several years, for those several years. This is based on BEA Regional Economic Information System (REIS) data on gross state product (GSP) by industry, 1997–2013, and GSP total data for 2014. The 2013 31-industry total is projected to 2014 assuming the export-base share stays the same. For 2015 through 2017, totals for 31 industries are projected based on the 2013–2014 GDP growth rate continuing. For each incentive, this percentage of value-added is then added up to get overall percentage of value-added for all incentives. The dollar figure for 2015 that is produced in the table is then estimated by multiplying this total percentage by the estimated 2015 total of value-added for export-base industries in that state.

Alabama

Because Alabama does not currently have a tax expenditure report, no attempt was made to measure actual economic development incentives in that state.

Arizona

Tax expenditure data for 2013 (total of $121.8 million) on enterprise zones, new employment tax credit, motion pictures credit, research and development tax credit, and other miscellaneous credits, come from *The Revenue Impact of Arizona's Tax Expenditures 2014/15*, produced by the Arizona Department of Revenue: https://www.azdor.gov/Portals/0/TaxExpenditures/FY15%20AZPreliminaryTaxExpenditureReport.pdf.

Data on Arizona Competes fund actual payments from FY 2012 through FY 2015 ($17.7 million) come from *Arizona Competes Fund: Annual Report, 2015*, produced by the Arizona Commerce Authority: https://d35uq38u77mscr.cloudfront.net/media/1063675/ACF_AnnualReport_FY15_110315.pdf. Note that the annual amount is likely to escalate over time as payments from earlier years increase.

Job training grants of $31.8 million for 2014 and 2015 are taken from a published list of job training grants from the Arizona Department of Commerce, at https://d35uq38u77mscr.cloudfront.net/media/1091259/Website-Grants-2616.pdf.

California

Tax expenditure data for 2015 (total of $2,472 million) for R&D credit, enterprise zones, accelerated depreciation for research and development, film credit, California Competes credit, hiring credit, and jobs tax credit, come from the California Department of Finance, *Tax*

Expenditure Report, 2015-16. http://www.dof.ca.gov/research/economic-financial/documents/2015-16_TE_Report_revised_01_15.pdf. Data on customized job training grants of $91 million for 2016 are taken from the website of the California Employment Training Panel at https://www.etp.ca.gov/fund_limitations.cfm. Information on California Competes annual credits, in 2016 and subsequent years, is from the website of the Governor's Office of Business and Economic Development, *California Competes Tax Credit: Frequently Asked Questions*, at http://www.business.ca.gov/Portals/0/CA%20Competes/Docs/California%20Competes%20FAQ%203-02-2016.pdf. This credit will eventually escalate toward $200 million per year, although this is not counted in analyses done here.

Colorado

Tax expenditure data for 2011 for investment tax credit and enterprise zones of $11.7 million are taken from the Colorado Department of Revenue, *Colorado Tax Profile and Expenditure Report 2012*, https://www.colorado.gov/pacific/sites/default/files/2012.pdf. Job growth incentive tax credit actual payments authorized in 2015 of $6.4 million are reported in the Colorado Economic Development Commission's *2015 Annual Report*, http://www.advancecolorado.com/sites/default/files/Incentives/2015_Annual_Reports/EDCAnnualReport2015.pdf. Additional promises of $195.7 million were made in 2015, so this amount is likely to considerably increase over time. This report also lists additional payments on various incentive programs of $1.0 million, with total incentives promised of $18.1 million, so these incentives too will increase over time. Customized job training of $4.5 million for 2016 is from the Colorado Office of Economic Development and International Trade, *Colorado First/Existing Industry Customized Job Training Fact Sheet*, at

http://www.advancecolorado.com/sites/default/files/Logos/ColoradoFirst_EI_Fact_Sheet_052915.pdf.

Connecticut

Tax expenditure data reported on a biennial basis lists tax expenditures of $231.4 million in 2016, which includes capital investment expenditures, property tax breaks for electronic data processing, film incentives, R&D credits, and enterprise zone credits. Data from the Office of Fiscal Analysis, Connecticut General Assembly, *Tax Expenditure Report: February 2016*, https://www.cga.ct.gov/ofa/Documents/year/TER/2016TER-20160201_Tax%20Expenditure%20Report%20FY%2016.pdf.

Property tax abatements for general manufacturing are listed as $47.9 million in 2011. Enterprise zone tax abatements are listed as $11.6 million in 2013. Figures on both of these are found in the publication from the Department of Economic and Community Development, State of Connecticut, *An Assessment of Connecticut's Tax Credit and Abatement Programs* (September 2014), http://www.ct.gov/ecd/lib/ecd/decd_sb_501_sec_27_report_revised_2013_final.pdf.

District of Columbia

Tax expenditure data reported here comes from the Office of Revenue Analysis, District of Columbia, *District of Columbia Tax Expenditure Report* (May 2014), http://cfo.dc.gov/sites/default/files/dc/sites/ocfo/publication/attachments/2014%20Tax%20Expenditure%20Report_0.pdf. The data are for Fiscal Year 2015, and they total $142.9 million in tax expenditure, mostly in the form of property tax breaks for high-tech businesses, commercial businesses, and insurance companies. The largest category is miscellaneous property tax exemptions, which may include some noneconomic development purposes.

Florida

Both tax expenditure data and tourism and other industry promotional data are found for 2015 in the *Florida Tax Handbook* (2014 edition), http://edr.state.fl.us/content/revenues/reports/tax-handbook/taxhandbook2014.pdf.

The 2015 and 2016 editions are also consulted to update a few numbers to 2015 levels. The bulk of these incentives are expenditures from special taxes to promote tourism/sports stadiums and convention centers, which together account for $849 million in 2015. There also are a variety of other programs, mostly various tax expenditures (including local property tax abatements), which total $90 million. In addition, the state has a number of cash grants, which total $75.4 million in actual spending in 2015. Of this, the bulk was from the Quick Closing Fund ($47 million) and the Transportation Infrastructure Fund ($20 million). Information on these incentives is found in the Florida Department of Economic Opportunity's *2015 Annual Incentives Report*, http://floridajobs.org/docs/default-source/reports-and-legislation/2015_annual_incentivesreport_123015.pdf. This report also suggests that these various grants and tax incentives are close to "maturity," in that the programs have been around long enough that annual payments are similar to annual approvals. Information on customized training expenditures of $14.8 million is found in CareerSource Florida, *Annual Report, 2014-15*, http://careersourceflorida.com/wp-content/uploads/2016/02/2015-10-8_CSF_AnnualReport_Final_Pages_Web.pdf.

Georgia

Information on tax expenditures for 2015 for various investment tax credits, jobs tax credits, films credit, research credits, and employer retraining credits come from the Fiscal Research Center of the Andrew Young School of Policy Studies at Georgia State University,

Georgia Tax Expenditure Report for FY 2017 (December 2015), https://opb.georgia.gov/sites/opb.georgia.gov/files/related_files/site_page/TER%202017%20Final%20Deliverable%20-Second%20Version-12-14-2015.pdf. The total is $430 million, of which $243 million is made up of film credits. Information on $41 million in deal-closing-fund spending on economic development projects in 2015 is taken from the Georgia Budget and Policy Institute, *Overview: 2015 Fiscal Year Budget for Business Subsidies* (January 2014), http://gbpi.org/wp-content/uploads/2014/01/Overview-2015-Fiscal-Year-Budget-for-Business-Subsidies2.pdf. Information on $12.7 million in the Quick Start program's spending in 2014 on customized job training is taken from the Georgia Budget and Policy Institute, *Overview of Georgia's Fiscal 2014 Budget for Higher Ed*, http://gbpi.org/wp-content/uploads/2013/02/fy2014_Budget-Analysis_Ed_higher-ed_2.pdf.

Illinois

The most recent information on tax expenditures is from FY 2014, which comes from the Illinois Comptroller, *Tax Expenditure Report: Illinois, Fiscal Year 2014.* This report lists $611.4 million in state economic development tax credits (p. 7). However, many of them are sales tax exemptions, which in general are not treated in this paper as economic development incentives. For calculating incentives, this paper excludes $223.2 million in sales tax exemptions for various business purchases. The exception is that this paper includes the manufacturer's purchase credit, which is a credit on tax-exempt purchases of machinery and equipment, taken against other sales taxes, and amounts to $49 million. The remaining total of state economic development tax credits is $388.2 million. In addition, the report lists an investment tax credit of $56.1 million in FY 2012 which affects local government revenue from the state (p. 7). This paper also attempts to calculate property tax relief provided to industrial and commercial property in Cook County

for the purpose of providing special relief for new investments from a higher classification rate for such property. From the Illinois Department of Revenue website I get 2014 data on total Cook County property taxes ($11.735 billion, Table A) and the percentage that is commercial and industrial (38.7 percent, Table 15), http://www.revenue.state.il.us/AboutIdor/TaxStats/PropertyTaxStats/2014/, from which commercial and industrial property taxes can be calculated. In the Chicago Metropolitan Agency for Planning publication *Examination of Local Economic Development Incentives in Northeastern Illinois* (August 2013), it is reported that 5.8 percent of all commercial/industrial property in Cook County as of 2011 received this special lower property tax classification (p. 4). (If anything, the percentage would be higher in 2014 or 2015.) This means this property is assessed at 10 percent rather than 25 percent, which means the incentive for this property class is equal to 1.5 times their actual property tax bill. Multiplying 11.735 billion times 38.7 percent times 5.8 percent times 1.5 yields an estimated incentive value in 2014 of $395.1 million, http://www.cmap.illinois.gov/documents/10180/82875/FY14-0009+LOCAL+ECONOMIC+INCENTIVES+REPORT.pdf/51b8f555-4579-42df-8667-87587fcc14f1. The State of Illinois, Department of Commerce and Economic Opportunity, in its *Illinois Workforce Development Fpy'14/Sfy'15 Annual Report*, has estimates that customized job training was $13 million in 2014,https://www.doleta.gov/Performance/Results/AnnualReports/PY2014/IL.pdf. In the Department of Revenue, State of Illinois, *Memorandum on FY2013 Economic Development Unified Budget*, it is reported that FY2015 Department of Transportation Expenditures on economic development transportation infrastructure (e.g., access roads) totaled 26.1 million in Fiscal Year 2015,

http://www.revenue.state.il.us/AboutIdor/TaxStats/AnnualUnified/UnifiedBudget2013.pdf. The Illinois Department in Revenue reports that for 2013 property taxes, general abatements for commercial and industrial property totaled $5.7 million (Table 26). Enterprise zone abatements totaled $39.7 million in 2013.

http://www.revenue.state.il.us/AboutIdor/TaxStats/PropertyTaxStats/2013/.

Indiana

Information on many regular state and local tax breaks is taken from the 2014 tax incentive report of the Indiana Legislative Services Agency, *Indiana Tax Incentive Review*, https://iga.in.gov/static-documents/0/b/0/8/0b08377d/indiana_tax_incentive_review_2014_annual_report.pdf. Included are various enterprise zone credits, research expense credits, EDGE credits, the Hoosier Business Investment Credit, and other miscellaneous business incentives. These tax incentive amounts are generally for FY 2016. Included are $25.9 million in incentives under the individual income tax (Appendix 3), $151.1 million in incentives under the corporate income tax (Appendix 4), $44.9 million in other miscellaneous incentives (Appendix 6), and $6.2 million in local revenue loss from other tax incentive provisions (Appendix 8). The total for FY 2016 is $228.1 million. Note that the estimated cost of the EDGE program was $72 million in FY 2016. In 2015, Indiana agreed to new EDGE contracts whose incentives totaled $198 million, so clearly over time this program activity will increase unless most of these incented jobs are never created. (Figures on EDGE contracts are derived from an online transparency portal of the Indiana Economic Development Council at https://transparency.iedc.in.gov/Pages/ContractSearch.aspx.) Similarly, the estimated cost of the Hoosier Business Investment Credit, according to ILSA, was expected to be $8.4 million in FY 2016, yet the new contracts for HBIC in 2015 totaled $28 million. The IEDC transparency portal

also reports activity over the past several years for several other grant programs, the most important of which is the Skill Enhancement Fund. Unfortunately, it only reports the original contract plus the amount paid out up to the present. Looking at the time pattern of contracts awarded versus grants paid from 2012 to 2015, it seems likely that in 2015 at least $13.3 million in SEF contracts were paid out (20.0 in new contracts were written in 2015). In addition, it appears that $1.7 million in SBIR contracts were probably paid out in 2015, https://iga.in.gov/legislative/2016/publications/tax_incentive_review/#document-0b08377d. Property tax abatements are estimated at $253 million in 2013 by Faulk and Hicks (2013), "An Analysis of State and Local Tax Incentives in Indiana," available at http://projects.cberdata.org/reports/IEDC-TaxIncentives-2013Nov21-web.pdf.

Iowa

The state business tax credit estimate for 2015 of $178 million is taken from Peter Fisher's report for the Iowa Fiscal Partnership, "*Here a Tax Break, There a Tax Break, Everywhere a Tax Break,*" January 2016, http://www.iowafiscal.org/here-a-tax-break-there-a-tax-break-everywhere-a-tax-break/. It looks as if 2015 was actually an unusually small year for Iowa state tax breaks, as business tax breaks in that year were roughly at the same level they had been since 2008 in nominal terms, and tax breaks are expected to grow to $273 million in 2017 and $295 million in 2018, based on the Iowa Department of Revenue, Table 9, *Contingent Liabilities Report*, December 2015, https://tax.iowa.gov/sites/files/idr/Contingent%20Liabilities%20Report%201215.pdf. In addition, an independent perusal of the last comprehensive evaluation of tax expenditures, for the year 2010, suggests state business tax incentives totaled $184 million in 2010—see tax expenditures report and Excel worksheet available from the Iowa Department of Revenue at

https://tax.iowa.gov/report/Tax-Expenditures. Iowa also provides some property tax abatements. According to the 2010 tax expenditure report, the total exempted industrial property had a value of 149.3 million—see the Excel spreadsheet available at the Iowa Department of Revenue at https://tax.iowa.gov/report/Tax-Expenditures. This paper assumes a property tax rate of 3.07 percent, which yields 2010 property tax abatements of $4.6 million. (The 3.07 percent rate is derived from the ratio of TIF property tax revenues to TIF incremental property value for 2012, as reported in Anthony Girardi's report for the Iowa Department of Revenue, *Iowa Tax Increment Financing Tax Credits Program Evaluation Study* (December 2013), available at https://tax.iowa.gov/sites/files/idr/TIF%20Evaluation%20Study%202013.pdf. The assumption is that average tax rates in tax abatement areas will be similar to average tax rates in TIF areas.) In addition, Iowa provides some direct grants and forgivable loans. In the Iowa Economic Development Authority's *Fiscal Year 2015 Annual Report*, it is reported that from January 2011 to January 2015, Iowa provided $56.6 million in direct assistance, versus tax credits of $478.1 million, http://www.iowaeconomicdevelopment.com/userdocs/documents/ieda/2016_IEDAReport_ByStatus.pdf. This appears to be based on contracts, but if we assume the payout rate for the grants and forgivable loans is at least as rapid as that for tax credits, the implied percentage of grants to tax credits is 11.8 percent. This percentage appears to be compared only to tax credits provided by the Iowa Quality Jobs Program. In 2015, these tax credits had a payout of $20.8 million, based on the previously referenced *Contingent Liabilities Report.* Multiplying $20.8 million by 11.8 percent yields estimated direct assistance of $2.5 million in 2015.

Kentucky

State tax expenditures for Fiscal Year 2015 are found in the Office of State Budget Director, Commonwealth of Kentucky, publication *Tax Expenditure Analysis, Fiscal Years 2014-2016*, http://osbd.ky.gov/Publications/Documents/Special%20Reports/Tax%20Expenditure%20Analysis%20Fiscal%20Years%202014-2016.pdf. These total $202.6 million, of which the largest amount is $51.8 million for the Kentucky Job Development Fund. However, other incentives include earmarked funds for the equine industry and the tobacco industry, and TIF credits against state taxes. The state also allows local property tax abatements. These are not directly reported. However, based on data on average combined local millages, and average property tax relief from the state property tax for projects financed by IRBs, the estimated amount of local property tax abatements in 2015 is $30.6 million. (This combines data from the state tax expenditure analysis referenced above, which pegs state property tax relief for IRB projects at $2.6 million annually, with information from the Kentucky Department of Revenue, *Property Tax Rates 2015*, which calculates that IRB areas lower the state rate by 10.7 cents per $100, whereas the average combined property tax rate locally is 125.8 cents per $100.) http://revenue.ky.gov/NR/rdonlyres/9FBE2D86-8D63-4542-8A09-761C48B60901/0/2015TaxRateBook.pdf. The state also provides grants and forgivable loans. The latest information on actual spending on this program indicates spending in 2010 of $10.2 million (see Anderson Economic Group, *Review of Kentucky's Economic Development Incentives*, 2012, at http://www.andersoneconomicgroup.com/portals/0/upload/aeg%20ky%20incentive%20report_jun112012.pdf). It also seems likely that local areas provide tens of millions or even hundreds of millions dollars annually in revenue for local tax increment financing districts. Such TIF credits are not included in our incentive totals.

Louisiana

State tax expenditure data for 2015 or 2014 are reported in the Louisiana Department of Revenue's publication *Tax Exemption Budget 2014-2015*, 2015, http://revenue.louisiana.gov/Publications/ TEB(2014-2015).pdf. For tax incentives subject to contracts, the report cites a figure of $454.2 million for 2014. A huge amount of this is made up of subsidies for films, which total $250.4 million. However, other significant incentives include $55.8 million for the Quality Jobs program and $56.5 million for enterprise zones. In addition, for the following year, 2015, other tax exemptions that should be regarded as business incentives total $40.8 million. The most important such incentives amount to $28.2 million for rehabilitation of buildings in downtowns and cultural districts. Louisiana authorizes industrial tax incentives of 10 years. Good Jobs First estimates the annual cost of such incentives at $977 million in 2012 at their Accountable USA website http://www.goodjobsfirst.org/states/louisiana. They do not explain how this number is derived; however, it seems roughly consistent with other data. The state of Louisiana reports approved property tax exemptions over the 10-year period for this program at the website http://www.opportunitylouisiana.com/boards-reports-and-rules/performance-reporting. From totaling all incentive approvals in the seven-year period from 2008 to 2014 for the 10-year ITE program, the 10-year total value of tax exemptions granted is reported as $10,001 million. Dividing by 10 implies that each year would have a forgone tax amount of $1,000 million, or $1 billion. But this omits three years of exemption approvals from the calculation. If these three years had an average annual award level similar to the seven reported years, annual average exemptions would be $1,428 million. However, some of these projects will not occur. A $977 million level implies that a little over two-thirds of the planned industrial property developments actually occur, which seems reasonable. In addition, a recent state tax reform report for Louisiana reports that "the reduction of the property tax base from the

industrial tax exemption program is approximately the same size as the homestead exemption in terms of reducing the tax base" (see p. 10 of Jim Richardson, Steven Sheffrin, and James Alm, *Executive Summary, Louisiana Tax Study, 2015*, http://murphy.tulane.edu/files/programs/Executive_Summary_Presentation_copy.pdf). The Louisiana Tax Commission, *Annual Reports 2015* (http://www.latax.state.la.us/Menu_AnnualReports/UploadedFiles/Annual%20Report%202015.pdf), reports that annual forgone revenue from the homestead tax exemption is $771.8 million. For this paper, the $977 million figure is used. Customized job training figures for 2015 were derived from the Center for Community Economic Research (C2ER) database on state economic development expenditures, at http://www.stateexpenditures.org/. This in turn reflects spending on a fast-start training program for new and expanding facilities, on page 7 of the annual budget of the Louisiana Department of Economic Development, http://www.doa.la.gov/OPB/pub/FY15/SupportingDocument/05A_Department_of_Economic_Development.pdf.

Maryland

Maryland tax expenditure statistics for 2015 are provided in the Maryland Department of Management and Budget's report, *Maryland Tax Expenditures Report Fiscal Year 2016*, http://dbm.maryland.gov/budget/Documents/operbudget/FY2016TaxExpendituresReport.pdf. These total $68.5 million. Prominent incentives include $30.1 million for various R&D and biotech tax credits, $14.7 million for various enterprise zone tax credits, and $7.5 million for various film credits. In addition, the report says that local income tax credits are estimated as being 62 percent of the state credits. Because state credits total $14.3 million, estimated local income tax credits are $8.9 million. In addition, the state report only lists state enterprise zone

tax credits. Local enterprise zone property tax credits are estimated at $27.8 million. This is based on information in the Maryland Department of Assessments and Taxation's *Seventieth Annual Report*, 2014, http://dat.maryland.gov/Documents/statistics/AnnualRpt_2014.pdf. This report states that the state provides local areas with reimbursement for half the cost of these local credits, at a cost in 2014 of $13.9 million. The Maryland Economic Development Assistance Authority and Fund provides grants and loans to various economic development projects. For 2015, the programs expenditures exceeded loan repayments and other income, excluding general fund appropriations, by $13.2 million. $7.4 million in appropriations were made that year, but the balance in the fund declined.. For this paper, $13.2 million was assigned as the annual subsidy cost of this program. For this budget information, see p. III-557 of the State of Maryland's Fiscal Year 2016 Proposed Budget at http://dbm.maryland.gov/budget/Pages/operbudget/FY2016OperatingBudgetDocs.aspx. Tax increment financing revenue is estimated at $82.7 million. This is based on the Maryland Department of Legislative Services' *Fiscal Policy Note on SB 455*, 2016 session (http://mgaleg.maryland.gov/2016RS/fnotes/bil_0005/sb0455.pdf), which reports that tax-incremented property value totaled $6.7 billion. The Maryland Department of Assessments and Taxation Report referenced above reports that total assessed value of property is $662.7 billion as of 2013. The Census Bureau reports total local property tax revenue in Maryland of $8,177 million in 2013, http://www.census.gov/govs/local/. The $82.7 million estimate is derived by multiplying the percentage that TIF assessments make up of total assessments times total Maryland local property tax revenues. Such TIF costs are not included in our incentive totals.

Massachusetts

The state's tax expenditures for 2015 are listed in the Executive Office for Administration and Finance, Commonwealth of Massachusetts, *TAX EXPENDITURE BUDGET: Fiscal Year 2015*, http://www.mass.gov/dor/docs/dor/stats/teb/teb2015.pdf. For 2015, these expenditures total $483.8 million, of which the major components include $188.9 for research credits, $90.0 million for film credits, $66.1 million for investment tax credits, $45.2 million for brownfield redevelopment, and $45 million for rehabilitation of historic buildings by businesses. According to data from C2ER, Massachusetts's customized job training budget totaled $0.9 million in 2015, http://members.c2er.org/expenditure.asp.

Michigan

State and local tax expenditures for 2015 are listed in the Michigan Department of Treasury's *Executive Budget Appendix on Tax Credits, Deductions, and Exemptions: Fiscal Years 2015 and 2016*, https://www.michigan.gov/documents/treasury/ExecBudgAppenTaxCreditsDedExempts_FY_20152016_476553_7.pdf. The total is $834.4 million. Of that total, the largest incentive is actually legacy credits such as MEGA that have now been abolished, which total $480 million. Another large credit is $233.4 million for industrial property tax abatements. Other important credits include $88 million for Renaissance Zones and $28 million for brownfield redevelopment. The newer Michigan Business Development Program does not directly report annual spending. However, from the amount authorized each year from 2012 to 2015 and the amount actually paid out by year of the original grant, the likely annual spending on this credit is $54.4 million in 2015. This is based on assumed spending of 3 percent of commitments during the year the commitment was made, the first year, 45 percent in the second year, and 19 percent in the third year, with no spending

thereafter, and spending commitments of $58 million in 2015, $87 million in 2014, and $73 million in 2013. These spending patterns are based on spending by the end of 2014 on commitments made during the previous three years. This data combines information from the Fiscal Year 2014 annual report of the Michigan Business Development Program and the 2014–2015 annual report of the Michigan Economic Development Corporation, both available at http://www.michiganbusiness.org/legislative-reports/#msf. The annual report of the MEDC also reports direct spending on film incentives of $9.5 million in Fiscal Year 2015. The economic development expenditures database of C2ER reports annual state spending on customized job training and incumbent worker training of $17.5 million in 2015.

Minnesota

Tax expenditure data for 2015 is provided in a February 2014 publication of the Minnesota Department of Revenue, *Tax Expenditure Budget: Fiscal Years 2014-2017*, http://www.revenue.state.mn.us/research_stats/research_reports/2014/2014_tax_expenditure_links.pdf. The total of economic development tax incentives for that year is $135 million. (This total appears conservative. The February 2016 update to this budget increases this amount to $170 million for Fiscal Year 2016, and this appears to involve increasing the Fiscal Year 2016 estimates from their prior value, presumably because actual credit amounts exceeded what was expected back in 2014.) Of that $135 million, the largest contributors are $56.6 million for research tax credits, $35.3 million for historic rehab tax credits for businesses, and $24.4 million for tax credits for various zones. For programs provided on the spending side, information is provided at the website of the Minnesota Department of Employment and Economic Development, in its annual program summaries section: http://mn.gov/deed/about/what-we-do/agency-results/program-summaries/.

The new large economic development incentive program, the Minnesota Job Creation Fund, handed out awards of $10.5 million in Fiscal Year 2014 and $11.65 million in Fiscal Year 2015. However, the awards are paid only after actual job creation and investment, and they are paid over five years, so current annual dollars spent will be considerably less than these totals, and likely will be much less than long-run levels. For this paper, it is estimated that the program in 2015 spent about $1.7 million. (This is based on assumed spending of 3 percent of the Fiscal Year 2015 awards, and 13 percent of the Fiscal Year 2014 awards, during Calendar Year 2015.) In addition, the program summary website reports 2015 spending of $7.8 million on various incumbent worker training programs and $1.4 million on grants for small business investments.

Missouri

The best recent data on incentives awarded by the State of Missouri is in a required report released by the Missouri Department of Economic Development, *Tax Credit Accountability Report*, https://ded.mo.gov/upload/1099Reporting2015.pdf. Despite its title, the report also includes other state incentives, such as customized training, that are NOT tax credits. This paper uses the latest report, released in June of 2015, which contains data for 2014. This report reports total incentives paid out during that year of $201.8 million. From that amount, this paper subtracted $11.6 million in Neighborhood Assistance and $10.5 million in state TIF dollars, as these are not treated in this paper as economic development incentives. The resulting total is $179.7 million. This total may significantly increase over time. The report only cites $0.8 million in "Missouri Works" incentives for 2014. Yet this program authorized credits of $288.8 million in Calendar Year 2015 ($146 million for Boeing and $142.8 million for other companies), and $127.9 million for such incentives were authorized in 2014. These credits are payable based on payroll added or "retained" over at least a five-year period, and Missouri Works only started in

2013, so 2014 does not represent a "permanent" level of activity for the program. Even if some credits are never paid, it would seem reasonable that the eventual level of activity in this program might be somewhere around $75 to $100 million per year. Of course, this will be partially offset by the disappearance of the previous main state incentive program, Missouri Quality Jobs, which is listed as paying out incentives of $51.2 million in 2015, even though the program has been replaced.

Nebraska

Most of the information on Nebraska incentives comes from the Nebraska Department of Revenue, *Nebraska Tax Incentives: 2014 Annual Report to the Nebraska Legislature*, 2015, http://www.revenue.nebraska.gov/incentiv/annrep/14an_rep/2014_incentives_annual_report_FINAL.pdf. This report projects that the 2015 payout for the investment tax credits and job creation tax credits provided by the state's current main economic development program (Nebraska Advantage) and its former main program (Employment and Investment Growth Act, or LB775) will total $166.7 million in 2015. In addition, these two incentive programs have a total balance of credits earned but not yet paid of $919.4 million at the end of 2015. Not all of these will be paid out, as many earned credits will exhaust their carry-forward term and expire, but the report is anticipating that the annual payout will increase to $288.2 million by the year 2025. In addition to these state revenue losses, these two incentive programs also provide personal property tax exemptions. This appendix, by combining information on personal property taxes exempted by county in 2014 with information on county-specific tax rates (see the Nebraska Department of Revenue website at http://www.revenue.nebraska.gov/PAD/research/valuation/avg_rates/avg_rates_by_cnty.html), estimates the annual personal property taxes forgone because of these exemptions at $14.8

million. The tax incentives report also includes information on the following tax incentives: $1 million for the Rural Development Act (for 2013, the last year for which data are available); $0.8 million for the Microenterprise tax incentive (also 2013 as the last year with available data); and $4.4 million in R&D tax credits paid in 2014. The C2ER database shows that customized job training incentives totaled $11.5 million in 2015.

Nevada

Tax expenditure data for 2014 comes from the Nevada Department of Taxation's *2013-2014 Tax Expenditure Report*, 2014, available at http://tax.nv.gov/uploadedFiles/taxnvgov/Content/TaxLibrary/Tax_Expenditure_Report_2013-2014.pdf. The economic development–related tax expenditures for 2014 totaled $3.5 million, of which $3.0 million goes to a personal property tax abatement program that applies in urban areas primarily to very large new business investments, and only for personal property. Information on customized job training programs comes from the C2ER database, which reports 2016 customized job training spending at $0.6 million.

New Jersey

Tax expenditure data for 2015 is taken from the State of New Jersey's *Fiscal Year 2017 Tax Expenditure Report*, 2016, available at http://www.state.nj.us/treasury/taxation/pdf/taxexpenditurereport2016.pdf. (The 2015 information is given in the report, along with estimates for 2016 and 2017.) The 2016 tax expenditures totaled $207.5 million, of which the largest portion is $103.4 million for the Urban Transit Hub program and the second-largest is $54.5 million in research tax credits. These tax credits seem to be dramatically expanding. The FY2017 totals for this same set of tax credits is $564.9 million. The state also had a grant program, which is being replaced by some of these additional tax credits. The Business Employment Incentive

Program, in its last year of reports, had annual spending on incentive grants in 2013 of $175 million, as recorded in the New Jersey Economic Development Authority's *Business Employment Incentive Program, 2013 Annual Report*, available at http://www.njeda.com/web/pdf/ BEIP_FY2013_AnnualReport.pdf. In addition, according to C2ER, New Jersey had annual spending on incumbent worker job training of $29.7 million in 2015. It should be noted that the Incentives Database shows New Jersey's incentives as more than doubling from 2013 to 2015, and this expanded incentive availability does not seem to be fully reflected in actual tax credits in 2015, although 2017 shows a considerable expansion.

New Mexico

Information on state tax expenditures is available in the New Mexico Taxation and Revenue Department's *2015 Tax Expenditure Report*, available at http://www.tax.newmexico.gov/uploads/PressRelease/e19f5d4c8b014c6d870f8073d673341b/2015_Tax_Expenditure_Report_revised.pdf . These tax expenditures for economic development expenditures total $260.2 million in estimated expenditures for Fiscal Year 2015. In addition, there is $8.9 million in tax expenditures for which the latest data are for Fiscal Year 2014. The major tax expenditure is $69.9 million for the High Wages Tax Credit. There also are $93.4 million in tax credits related to various mineral and energy industries and $50 million in film credits. The state also provided $11.6 million in customized job training in 2015, according to a report on 2015 results for the Job Training Incentive Program, available at https://gonm.biz//uploads/documents/programs/JTIP_Companies_FY15.pdf. Local governments also provide extensive property tax abatements, but there appears to be no information on the size of the forgone revenue from such abatements.

New York

The information nearest to 2015 on state tax expenditures is available in the Department of Taxation and Finance, New York State, *FY 2016 Annual Report on New York State Tax Expenditures*, available at https://www.budget.ny.gov/pubs/archive/fy1516archive/eBudget1516/fy1516ter/TaxExpenditure2015-16.pdf. This report estimates total tax expenditures in 2015 for economic development at $1,375.6 million. Of those tax expenditures, $427 million are for film credits, $204 million are from the expired Empire Zone program, $150 million are from the Excelsior Jobs program, $146.2 million are for investment tax credits, and $130 million are for brownfield tax credits. For property tax abatements, the most comprehensive information for 2015 appears to be for New York City, from the City of New York, Tax Policy Division, *Annual Report on Tax Expenditures, Fiscal Year 2015*, https://www1.nyc.gov/assets/finance/downloads/pdf/reports/reports-tax-expenditure/ter_2015_final.pdf. The figures used are from 2015 and add up to New York City tax expenditures of $2,650.2 million. These include $1,888.2 million in tax expenditures for property tax relief on commercial and industrial property. In addition, New York City reports $437 million in tax expenditures from exempting most insurance company activity from taxation, as well as $308 million from capping business taxes at $1 million. Based on a report by the Office of the State Comptroller, *Annual Performance Report on New York State's Industrial Development Agencies Fiscal Year Ending 2013* (available at https://www.osc.state.ny.us/localgov/pubs/research/ida_reports/2015/idaperformance.pdf), annual industrial property tax abatements outside New York City, net of payments in lieu of taxes, totaled $591.2 million in 2013. (This is an update of similar estimates provided in the Fiscal Policy Institute's report *The Growing Budget Burden of New York's Business Tax Expenditures*, December 7, 2010, available at http://www.fiscalpolicy.org/

FPI_GrowingBurdenOfBusinessTaxExpenditures.pdf.) The FPI report also estimates that commercial tax abatements outside New York City totaled $206.2 million in 2009.

North Carolina

According to the database on state tax expenditures, North Carolina provided economic development tax expenditures in 2015 that totaled $170 million. (Available in spreadsheet form at http://www.dor.state.nc.us/publications/biennial.html. The publication accompanying this spreadsheet is the North Carolina Department of Revenue's *Biennial Tax Expenditure Report, 2015*, available at http://www.dor.state.nc.us/publications/nc_tax_expenditure_report_15.pdf.) This total state tax expenditure includes $107.6 million for renewable energy property and $57.7 million for research tax credits. In addition, the latest report suggests that the state's Job Development Investment Grant (JDIG) program had disbursements in 2015 of $46.2 million. (See North Carolina Department of Commerce, *Job Development Investment Grant, 2015 Annual Report*, available at https://www.nccommerce.com/Portals/0/Incentives/2015-JDIG-Annual-Report.pdf.) JDIG's costs seem likely to increase, as one projection by the state suggests liabilities in Fiscal Year 2017 of $73.7 million. (See *JDIG Funding Study, 2016–17*, available at https://www.nccommerce.com/Portals/0/Incentives/JDIG-Funding-Study-(3-17-16)v2.pdf.) In addition, local incentives provided over the four years from mid-2011 to mid-2015 for the JDIG program, the One North Carolina incentive program, and the Job Maintenance and Capital Development Fund (JMAC) totaled $46.8 million, for an annual average over these four years of $11.7 million. (See North Carolina Department of Commerce, *Economic Development Grant Report, October 1, 2015*, available at https://www.nccommerce.com/Portals/0/Incentives/2015%20ED%20Grant%20Report%20-%20Final.pdf.) This understates actual disbursements, as it only includes disbursements for awards made in that time period, not awards made in prior

years. Over the nine-year period from 2007 to 2015, One North Carolina state grant payments totaled $28 million, for an average of $3.3 million per year. This excludes payments made under One North Carolina for projects that also received JDIG funding; the available reports do not seem to allow this funding to be separated. Finally, in Program Year 2014, $42.8 million in payments were made under an expired incentive program, the 3J program; no information is available on the amount of payments under this program in 2015. The 2015 funding levels were projected by calculating percentages for the relevant year and time periods and projecting to one-year levels.

Ohio

According to the latest annual report on state tax expenditures, Ohio annual resources in Fiscal Year 2015 for economic development tax expenditures totaled $225.6 million. (See Office of Budget and Management, *Tax Expenditure Report, Fiscal Years 2016–17*, available at http://obm.ohio.gov/Budget/operating/doc/fy-16-17/State_of_Ohio_Budget_Tax_Expenditure_Report_FY-16-17.pdf.) Of that total, $113.4 million went to refundable job creation and retention tax credits, $64.6 million went to historic rehabilitation tax credits, and $26.3 million went to research tax credits. On the spending side, the state appropriated annually in 2014 and 2015 $129.2 million in each year for the Third Frontier program, which provided a variety of grants and loans to support high-technology development and companies. This is proposed to increase to $169.8 million annually in the next two-year biennium budget. (See http://montrosegroupllc.com/kasich-budget-proposes-31-percent-third-frontier-funding-increase/.) In addition, the state provided $29.4 million in Incumbent Worker Job Training grants in 2015 of up to $4,000 per worker, although this is restricted to no more than $100,000 per company, which significantly restricts the incentive

value of these grants. At the local level, it is reported that in 2014, $88.9 million was provided in local tax credits associated with the state's enterprise zone program. (For data on both the Incumbent Worker Training program and enterprise zones, see Ohio Development Services Agency, *2015 Annual Report*, available at https://development.ohio.gov/files/reports/2015DEVAnnualReport.pdf.) The state also authorizes additional property tax abatements for industrial and commercial properties in "Community Reinvestment Areas." There appears to be no comprehensive current data available on annual forgone revenue under this tax abatement program. However, in a 2009 report (Ohio Department of Development, *Ohio Economic Development Incentive Study*, available at https://www.cdfa.net/cdfa/cdfaweb.nsf/ord/0a0aefbda0a26bdd8825793600678216/$file/ohioincentivestudy.pdf), it is stated that over the life of these abatements, which last up to 15 years, total annual school district forgone property taxes under this program totaled $622 million. This implies annual forgone revenue of at least $41.4 million, at least as of 2006.

Oregon

According to the biannual tax expenditure report (State of Oregon, *2015–17 Tax Expenditure Report*, available at https://www.oregon.gov/DOR/programs/gov-research/Documents/full-tax-expenditure_2015-17.pdf), average tax expenditures per year during the 2013–2015 time period were $331.5 million. Of that amount, fully $183.8 million per year went to the Strategic Investment Program (SIP), a property-tax abatement program that only applies to investments of more than $100 million. (Because of its large minimum size requirement, this program is not included in this paper's incentives database.) According to Good Jobs First, this program was originally adopted in part to target Intel (see Good Jobs First, *Accountable USA-Oregon*, available at http://www.goodjobsfirst.org/states/oregon). This SIP program is expected

to expand to $260.3 million per year during the 2015–17 biennium. In addition, $87.1 million annually goes to business incentives for renewable energy investments, $43.4 million goes to mostly property tax breaks for various enterprise zone programs, $10.1 million goes to film incentives, and $7.2 million goes to research tax credits. (The renewable energy program has been phased out but still has significant expenditures as of 2013–2015.) In addition, according to C2ER, Oregon tax spending on various industry grants to businesses locating or expanding in Oregon totaled $26.7 million annual in 2014. (See C2ER and Center for Regional Economic Competitiveness, *Business Incentives and Economic Development Expenditures: An Overview of Oregon's Program Investments and Outcomes*, available at http://www.stateincentives.org/media/2015/outcomes/Oregon_State_ Specific_Report_-_August_2015.pdf.)

Pennsylvania

According to the state's tax expenditure report, included in the governor's budget proposal (Commonwealth of Pennsylvania, *2016–17 Pennsylvania Executive Budget*, available at http://www.budget.pa.gov/PublicationsAndReports/CommonwealthBudget/Documents/2016-17%20Proposed%20Budget/2016-17%20Budget%20Document%20Web.pdf), Pennsylvania's state tax expenditures for economic development in Fiscal Year 2015 totaled $291.5 million. This included $$97.6 million in state tax exemptions from various "zone" programs, $64 million in tax incentives from not including manufacturing and research property in the state as part of the apportionment formula, $60 million in film credits, and $55 million in R&D credits. In addition, according to the state tax expenditure reports available from C2ER, $20 million in 2015 was devoted to the Pennsylvania First jobs credit grant program. This amount is expected to more than double to $45 million in 2016. (See Council for Community and Economic Research,

State Economic Development Expenditures Database, available to C2ER members at https://www.c2er.org/products/stateexpenditures.asp.) This same database reports $0.2 million in 2015 spending on customized job training. In addition, none of this includes local tax expenditures, which seem likely to be in the hundreds of millions of dollars annually for industrial incentives. For example, a report by the Philadelphia comptroller suggests that local tax credits for just one program, the Keystone Opportunity Program, in the last year of available data for the program, 2012, totaled $30.7 million. (See Office of the Comptroller, *An Analysis of the Keystone Opportunity Zone Program, 1999–2012: The Costs and Benefits to Philadelphia*, available at http://www.philadelphiacontroller.org/publications/KOZ-Report_March2014.pdf.) There are many other KOZ areas in the state, and other local property tax abatement programs for businesses.

South Carolina

A fairly comprehensive account of state incentives for economic development is provided by the South Carolina Revenue and Fiscal Affairs Office, *Economic Development Incentives*, available at http://rfa.sc.gov/files/Economic%20Development%20Incentives%20Report%202016.pdf. According to this report, there were a total of $380.3 million in state incentives distributed in Fiscal Year 2014. Of this total, $242.4 million was in tax credits and $137.8 million in budget spending. Large tax credits include $75.5 million for Job Development Credits, $52.0 million for the Jobs Tax Credit, $23.4 million for R&D tax credits, and $16 million in film credits. On the expenditure side, the largest single program is for the Closing Fund, which totaled $24 million in Fiscal Year 2014 and increased to $45.4 million in Fiscal Year 2014. In doing the calculations, we use Fiscal Year 2014 total incentives of $356.3 to calculate a 2014 percentage total, and we

use the $45.4 million updated figure for the Closing Fund to calculate a 2015 percentage total. In addition, the state provided $74.4 million in Fiscal Year 2017 in reimbursements to local governments for accelerated depreciation schedules for manufacturing property (see SC Revenue and Fiscal Affairs Office, *Projected Property Tax Revenue by Assessment Classification and Reimbursements by the State for FY 2016–17*, available at http://rfa.sc.gov/files/FY%2017%20Projected%20Property%20Tax%20and%20Reimbursements%20%28Table%29%20website.pdf). The most difficult incentives to quantify for South Carolina are its very large property tax incentives. One major tax incentive program is Fees in Lieu of Taxes (FILOT). This typically lowers property taxes for manufacturers from an assessment ratio of 10.5 percent to 6.0 percent, as well as freezing property values for tax purposes. (For a description, see South Carolina Department of Revenue, *South Carolina Tax Incentives for Economic Development November 2015,* available at https://dor.sc.gov/resources-site/lawandpolicy/ Documents/0-SC%20Tax%20Incentive%20for%20Economic%20Development-WebComplete.pdf.) Total property-tax revenue from these FILOT projects is projected to be $391.9 million in Fiscal Year 2017. It seems conservative to project an incentive cost for FILOT of (4 percent / 10.5 percent) times $391.9 million, or $168 million. In addition, the *Economic Development Incentives* report does not seem to include costs of the ReadySC customized job training program, which totaled $5.8 million in Fiscal Year 2016. (See p. 189 of State of South Carolina, *Executive Budget 2015–2016*, available at http://www.stateexpenditures.org/downloads/reference/SC_Proposed_2016.pdf.)

Tennessee

Some limited information on state tax expenditures is found in the state budget (see State of Tennessee, *The Budget 2014–15*, available at http://www.tn.gov/assets/entities/finance/budget/ attachments/2015BudgetDocumentVol1.pdf). This budget reports $98.2 million in economic development tax incentives, including $50.1 million for the Jobs Credit and $55.7 million for the industrial machinery credit. The state budget also reports $121.2 million in state spending for economic development, of which the largest portion is $64.9 million in 2015 for Fast Track assistance to new and expanding firms. However, one of the largest incentives in Tennessee is property tax abatements, which are not regularly tracked. The latest statewide information appears to be available in a report from the Tennessee Advisory Commission for Intergovernmental Relations (TACIR), in 2004 (see TACIR, *Property Tax Abatements and Payments in Lieu of Taxes: Impact on Public Education*, available at https://www.tn.gov/assets/entities/tacir/attachments/prop_tax_abate.pdf). This report listed net tax relief from these incentives at $86.3 million as of 2002, but it also found that the data were incomplete and said that this was almost certainly a significant underestimate. To get current estimates, this appendix extrapolated from the most reliable current estimates of property abatements at the local level in Tennessee, which are for Shelby County (the location of Memphis). The Shelby County trustee reports that net industrial property-tax incentives in the county, after deducting in lieu payments, totaled $44.0 million in 2014. (See Shelby County Trustee, *In Lieu Properties Annual Report 2014*, available at http://www.shelbycountytrustee.com/ ArchiveCenter/ViewFile/Item/1264. This subtracts out the housing projects from the total.) According to a state Comptroller of the Treasury report, the total PILOT (payment in lieu of taxes) industrial property value in Shelby County is worth about $2.089 billion, out of a statewide total of $12.014 billion. (Data on each industrial property

covered by payment in lieu of tax agreements can be found in Tennessee Office of the Comptroller of the Treasury, *IDB/H&ED Report 2015*, available at https://www.comptroller.tn.gov/sboe/idbsumm.asp. These numbers are then summed to get a state total of industrial property values covered by PILOTs. Unfortunately, this report does not make it clear whether the reported property values are assessed versus market values, or for real or personal property, and whether the property is in a particular city, although county is identified. Hence it is impossible to directly use these numbers to get a statewide abatement total. However, if one assumes the biases are similar for Shelby County versus the rest of the state, one can extrapolate from the more detailed Shelby County data. Extrapolating implies a statewide total of $253 million [= $44 million × (12.014 / 2.089]).

Texas

Information on state tax expenditures, and some local tax expenditures, is available from the Texas Comptroller of Accounts, *Tax Exemptions and Tax Incidence*, March 2015, http://www.texastransparency.org/State_Finance/Budget_Finance/Reports/Tax_Exemptions_and_Incidence/incidence15/96-463_Tax_Incidence2015.pdf. This publication suggests economic development tax incentives totaled $544.1 million in Fiscal Year 2015. Of that amount, the largest portion, $221.5 million, goes to school property tax abatements ("Chapter 313" property tax abatements). This program is expected to ratchet up to a much higher level of $525.1 million in 2017 and remain at close to that level in subsequent years. Other incentives include $169.2 million in research and development tax incentives (including $126.2 million in special sales tax breaks tied to research and development), $78.7 million in special tax incentives to encourage expansion in the oil and gas industry, and $44.2 million in special tax incentives in Texas enterprise zones. Another report by the Texas comptroller lists

state spending supporting business incentives that totaled $320.1 million in 2013. (See Texas Comptroller of Accounts, *Update To Texas Economic Development Incentive Comprehensive Summary Tables*, available at http://www.texasahead.org/reports/incentives/pdf/96-1453-2-Updated-Texas-Economic-Development-Incentive-Grid-2014.pdf.) Of this total, $120 million was in the Texas Enterprise Fund (a "deal-closing" fund), $95 million for film subsidies, $57.2 million to support emerging high-tech companies, and $47.9 million in workforce development incentives. C2ER describes some other state spending for economic development in 2015 totaling $30.4 million (see C2ER Economic Development Expenditure Database), including $13.6 million to support technology commercialization, $12.8 million to support an Economic Development Bank, and $4 million in special industry assistance. The school property tax abatements mentioned above do not include enterprise zone tax abatements. According to a report by the Texas Economic Development Bank, *FY 2014 Annual Report* (available at https://texaswideopenforbusiness.com/sites/default/files/01/23/15/bank_annual_report_fy2014.pdf), such enterprise zone tax abatements totaled $102 million in 2014. Texas also allows local governments to set up local economic development corporations to carry out economic development activities, funded by a local sales tax. These EDCs can carry out a variety of economic development activities. In 2013, business incentive activities included a total of $115.8 million, including $112.4 million in what are called "direct business incentives," as well as $3.4 million in job training incentives. (See Texas Comptroller, *Economic Development Corporation Report, Fiscal Years 2012–2013*, available at http://www.texastransparency.org/Local_Government/Reports/Economic_Development_Corporations/2013/edcr2013.pdf.) Finally, none of this includes so-called "Chapter 312" property tax abatements provided by cities and counties, which have been

available for a long time. The report on *Tax Exemptions and Tax Incidence* states that school property taxes are 55 percent of total Texas property taxes and that city and county taxes are the remaining 45 percent. Therefore, this appendix assumes that in 2017, Chapter 312 property tax abatements will be the product of [45 percent (city and county) divided by 55 percent (school)] times the $525.1 million in Chapter 313 incentives expected in that year. This may understate such incentives, as they have been established for much longer than Chapter 313 abatements.

Virginia

Only information that is somewhat dated is available on Virginia's tax expenditures. It comes from a 2009 report by the Commonwealth Institute, *A Drop in the Bucket: Assessing the High Cost of Virginia Tax Expenditures*, available at http://www.thecommonwealthinstitute.org/wp-content/uploads/2011/08/091109_drop_in_the_bucket_REPORT.pdf. For 2010, this report found $62.5 million in tax incentives for economic development, including $44.5 million for the coal industry, $10.0 million for enterprise zones, and $8.0 million for Major Facility Jobs Credits. More Virginia business incentives come in the form of expenditures, including $62.1 million in economic development grants and $12.4 million for enterprise zone business grants. In addition, there is $1.6 million in workforce development grants for business-oriented noncredit programs at local community colleges. These budget figures come from data made available from C2ER's State Economic Development Expenditure Database for 2015, available at http://www.stateexpenditures.org/downloads/reference/VA_FY16_Proposed.pdf.

Washington

Information for state of Washington tax expenditures is available from the Washington State Department of Revenue, *2012 Tax Exemption Study*, available at

http://dor.wa.gov/docs/reports/2012/Exemption_study_2012/2012%20Exemption%20Study%20-%20Entire%20Report.pdf. Based on this study, the state had $121.4 million in tax credits for economic development in 2015, including $103.8 million in aerospace credits and $16.6 million in R&D credits. (This R&D credit actually expired at the beginning of 2015, so this amount presumably reflects some R&D credits received in 2015 for R&D activity in 2014.) Most of these aerospace credits would not be in our simulation model, as the simulation model in general does not reflect credits that only target a specific company, as these were designed to do.

Wisconsin

Comprehensive tax expenditure information is provided in the state of Wisconsin's *Summary of Tax Exemption Devices* , available at https://www.revenue.wi.gov/ra/15sumrpt.pdf. This report describes $197 million in business tax incentives in Fiscal Year 2014. Prominent incentives include $64.9 million for a manufacturing and agriculture credit, $39.6 million for various "zone" credits, $33.7 million for various research credits, $15.0 million for an economic development credit, and $15.8 million in special credits for the dairy industry. Some information on state spending for economic development is provided in C2ER, *State Economic Development Program Expenditures Database*, available on a subscription basis at http://members.c2er.org/expenditure.asp. These 2015 expenditures include $18 million in grants related to Jobs Tax Credits and $25.5 million in special industry assistance grants, mostly in agriculture. Grants to business of the Wisconsin Economic Development Corporation are reported to add to total spending in 2014 of $10.4 million. (See Legislative Audit Bureau, State of Wisconsin, *Wisconsin Economic Development Corporation*, available at http://legis.wisconsin.gov/LAB/reports/15-3full.pdf.)

APPENDIX G: TIME PATTERN OF INCENTIVES AND TAXES FOR EACH STATE

Appendix G simply provides a complete time series of incentives and taxes for each state. A table and figure for each state show gross taxes/value-added; incentives/value-added, and net taxes/value-added. For each state, these tax and incentive rates are shown for each year from 1990 to 2015. The rates are the ratio of the present value of gross or net taxes, or incentives, to the present value of value-added. The ratios are averages over the 31 export-base industries. The tables and figures report these ratios in percentage terms.

One could benefit from discussing each state in detail, and what changes in tax policy and incentive policy generated the patterns shown. However, in the interest of conserving space, I will simply mention one fairly obvious pattern across most of the figures and tables: in general, incentive regimes seem to shift abruptly at certain points in time because of major policy shifts, and then remain static for some time period.

In the following tables and figures, "Tt" is gross taxes, "It" is incentives, and "Nt" is net taxes.

Figure G1 Time Pattern of Incentives and Taxes for Alabama

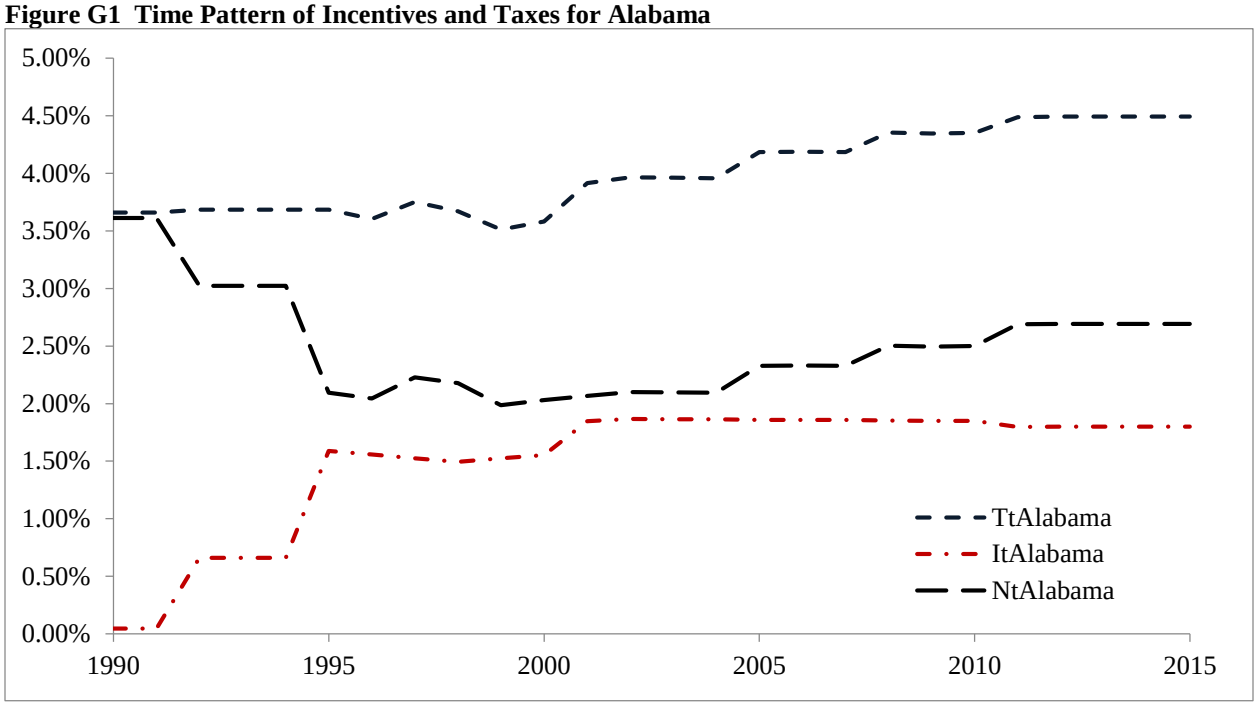

Table G1 Time Pattern of Incentives and Taxes for Alabama

Base year	TtAlabama	ItAlabama	NtAlabama
1990	3.66	0.05	3.61
1991	3.66	0.05	3.61
1992	3.68	0.66	3.02
1993	3.68	0.66	3.02
1994	3.68	0.66	3.02
1995	3.68	1.59	2.10
1996	3.60	1.56	2.04
1997	3.75	1.52	2.23
1998	3.67	1.49	2.18
1999	3.51	1.53	1.99
2000	3.58	1.55	2.03
2001	3.91	1.85	2.07
2002	3.97	1.87	2.10
2003	3.96	1.87	2.10
2004	3.96	1.86	2.09
2005	4.19	1.86	2.33
2006	4.19	1.86	2.33
2007	4.19	1.86	2.33
2008	4.36	1.85	2.50
2009	4.35	1.85	2.50
2010	4.35	1.85	2.50
2011	4.49	1.80	2.69
2012	4.49	1.80	2.69
2013	4.49	1.80	2.69
2014	4.49	1.80	2.69
2015	4.49	1.80	2.69

Figure G2 Time Pattern of Incentives and Taxes for Arizona

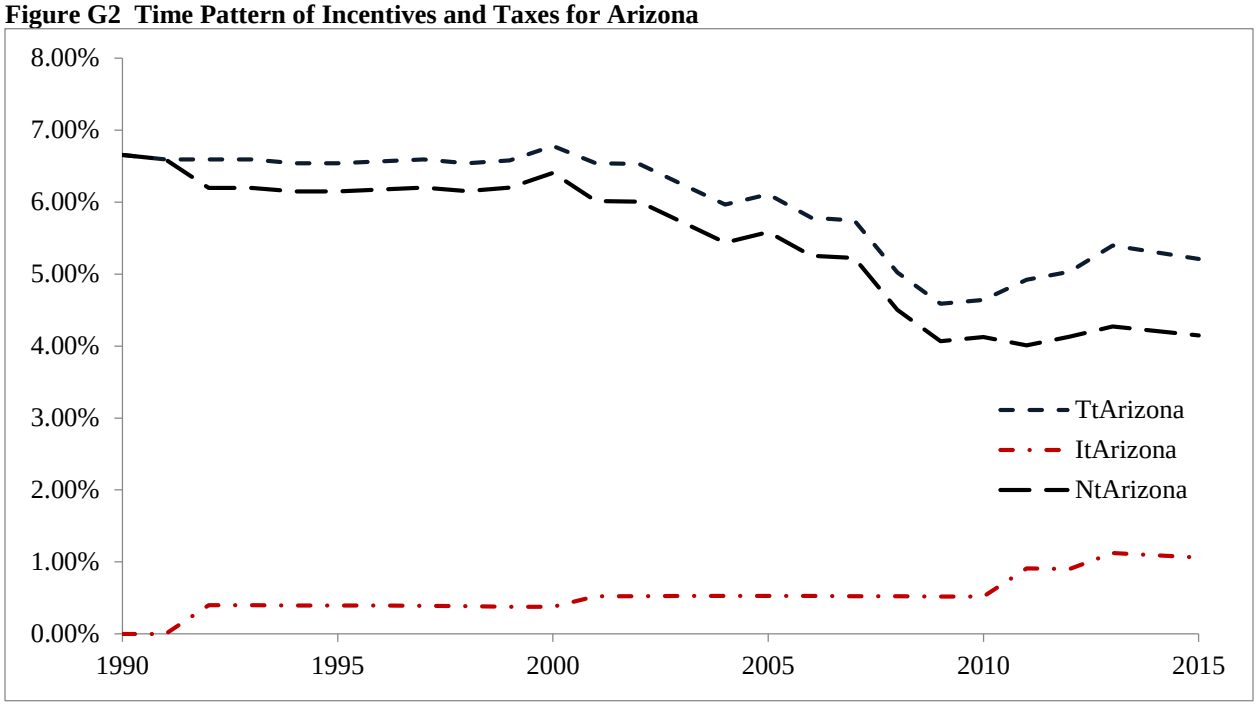

Table G2 Time Pattern of Incentives and Taxes for Arizona

Base year	TtArizona	ItArizona	NtArizona
1990	6.66	0.00	6.66
1991	6.59	0.00	6.59
1992	6.59	0.40	6.20
1993	6.59	0.40	6.20
1994	6.54	0.39	6.15
1995	6.54	0.39	6.15
1996	6.57	0.39	6.17
1997	6.59	0.39	6.20
1998	6.54	0.39	6.15
1999	6.58	0.38	6.20
2000	6.78	0.38	6.41
2001	6.54	0.52	6.02
2002	6.53	0.52	6.01
2003	6.25	0.53	5.72
2004	5.97	0.53	5.44
2005	6.11	0.53	5.58
2006	5.78	0.53	5.25
2007	5.75	0.52	5.22
2008	5.03	0.52	4.50
2009	4.59	0.52	4.07
2010	4.64	0.52	4.12
2011	4.92	0.91	4.01
2012	5.03	0.90	4.13
2013	5.40	1.13	4.27
2014	5.30	1.09	4.21
2015	5.21	1.06	4.15

Figure G3 Time Pattern of Incentives and Taxes for California

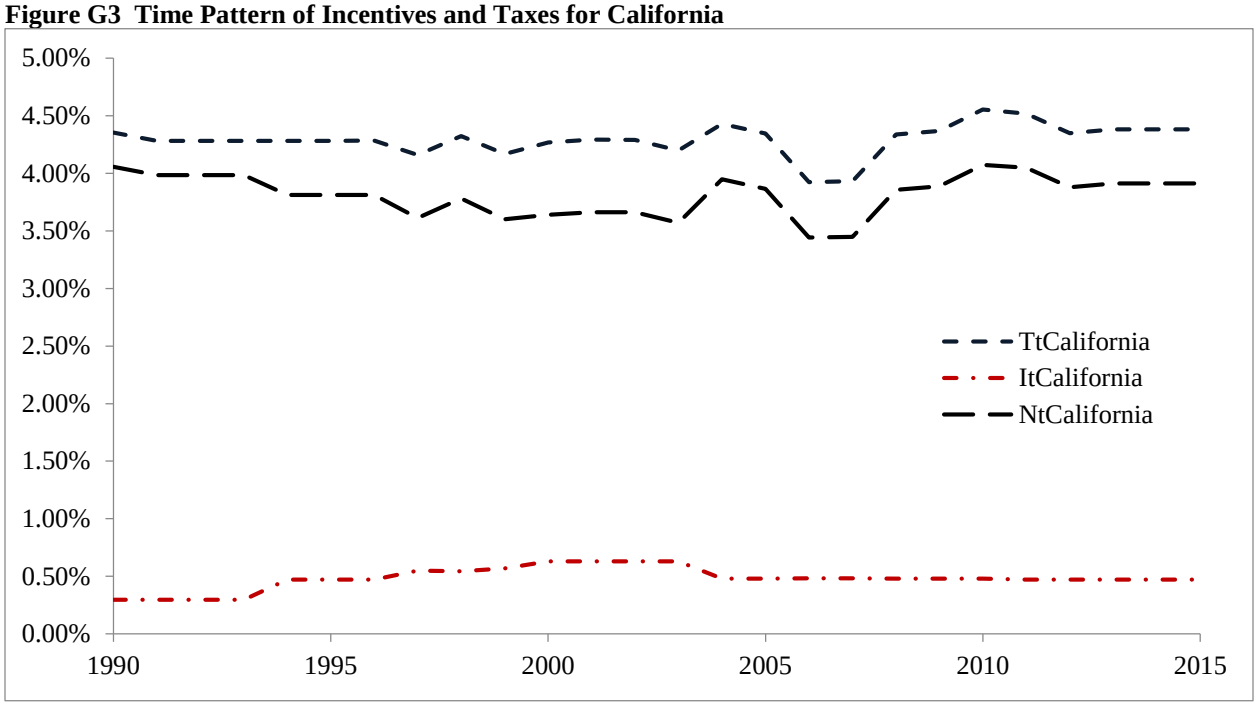

Table G3 Time Pattern of Incentives and Taxes for California

Base year	TtCalifornia	ItCalifornia	NtCalifornia
1990	4.36	0.30	4.06
1991	4.28	0.30	3.99
1992	4.28	0.30	3.99
1993	4.28	0.30	3.99
1994	4.28	0.47	3.81
1995	4.28	0.47	3.81
1996	4.28	0.47	3.81
1997	4.16	0.55	3.61
1998	4.32	0.54	3.78
1999	4.17	0.57	3.60
2000	4.27	0.63	3.64
2001	4.29	0.63	3.66
2002	4.29	0.63	3.66
2003	4.20	0.63	3.57
2004	4.43	0.48	3.95
2005	4.35	0.48	3.86
2006	3.93	0.48	3.44
2007	3.93	0.48	3.45
2008	4.34	0.48	3.86
2009	4.37	0.48	3.89
2010	4.55	0.48	4.07
2011	4.52	0.47	4.05
2012	4.35	0.47	3.88
2013	4.38	0.47	3.91
2014	4.38	0.47	3.91
2015	4.38	0.47	3.91

Figure G4 Time Pattern of Incentives and Taxes for Colorado

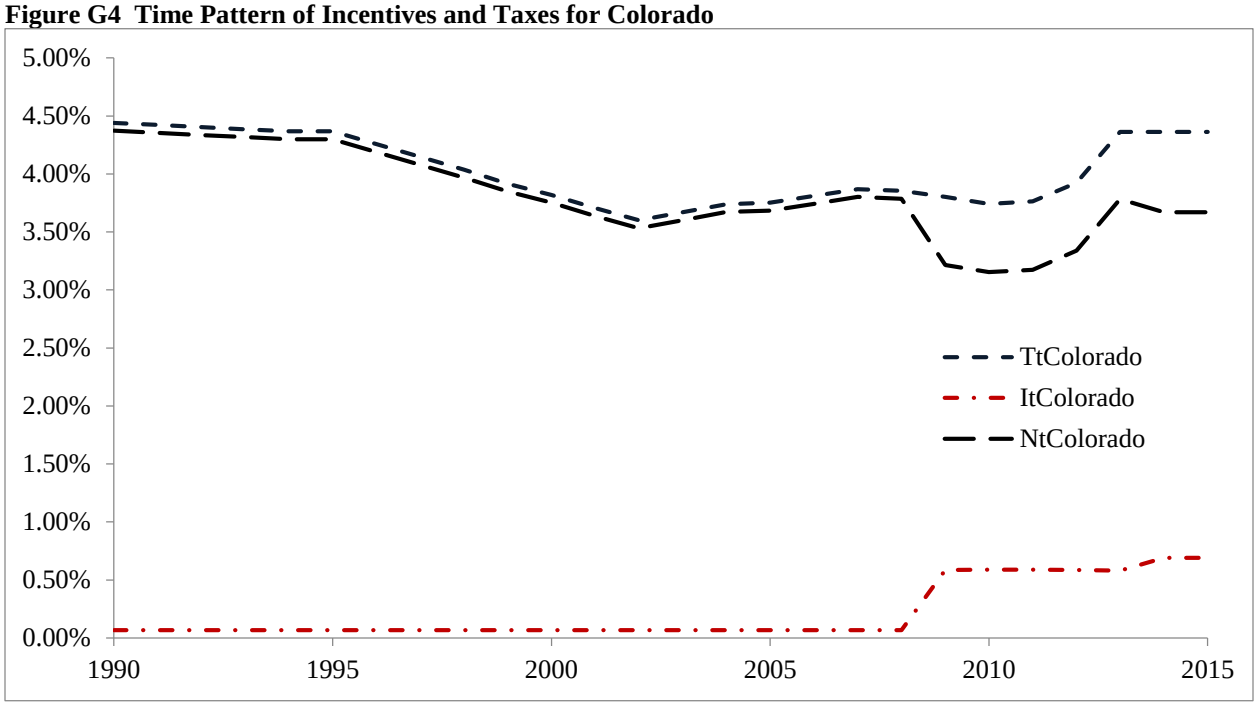

Table G4 Time Pattern of Incentives and Taxes for Colorado

Base year	TtColorado	ItColorado	NtColorado
1990	4.44	0.07	4.37
1991	4.42	0.07	4.35
1992	4.40	0.07	4.34
1993	4.39	0.07	4.32
1994	4.37	0.07	4.30
1995	4.37	0.07	4.30
1996	4.26	0.07	4.19
1997	4.15	0.07	4.08
1998	4.04	0.07	3.97
1999	3.92	0.07	3.85
2000	3.82	0.07	3.75
2001	3.71	0.07	3.64
2002	3.60	0.07	3.53
2003	3.67	0.07	3.60
2004	3.74	0.07	3.67
2005	3.75	0.07	3.68
2006	3.81	0.07	3.74
2007	3.87	0.07	3.80
2008	3.85	0.07	3.79
2009	3.80	0.59	3.22
2010	3.74	0.59	3.16
2011	3.76	0.59	3.17
2012	3.92	0.59	3.34
2013	4.36	0.58	3.78
2014	4.36	0.69	3.67
2015	4.36	0.69	3.67

Figure G5 Time Pattern of Incentives and Taxes for Connecticut

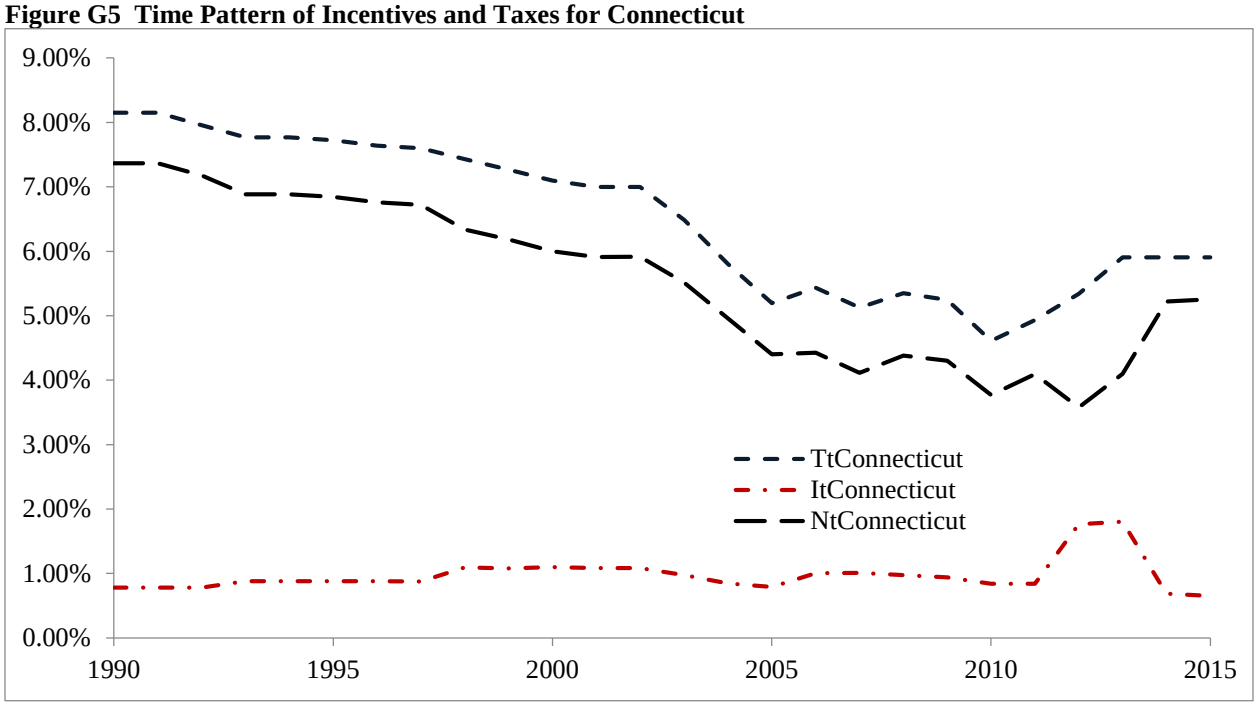

Table G5 Time Pattern of Incentives and Taxes for Connecticut

Base year	TtConnecticut	ItConnecticut	NtConnecticut
1990	8.15	0.78	7.37
1991	8.15	0.78	7.37
1992	7.96	0.78	7.18
1993	7.77	0.88	6.88
1994	7.77	0.88	6.88
1995	7.72	0.88	6.84
1996	7.64	0.88	6.76
1997	7.60	0.88	6.72
1998	7.43	1.09	6.34
1999	7.26	1.08	6.18
2000	7.10	1.10	6.00
2001	7.00	1.09	5.91
2002	7.00	1.08	5.91
2003	6.49	0.97	5.51
2004	5.80	0.85	4.96
2005	5.19	0.79	4.40
2006	5.43	1.01	4.43
2007	5.13	1.01	4.11
2008	5.35	0.97	4.38
2009	5.24	0.94	4.30
2010	4.61	0.84	3.77
2011	4.94	0.84	4.09
2012	5.34	1.76	3.58
2013	5.90	1.81	4.10
2014	5.90	0.69	5.22
2015	5.90	0.65	5.25

Figure G6 Time Pattern of Incentives and Taxes for District of Columbia

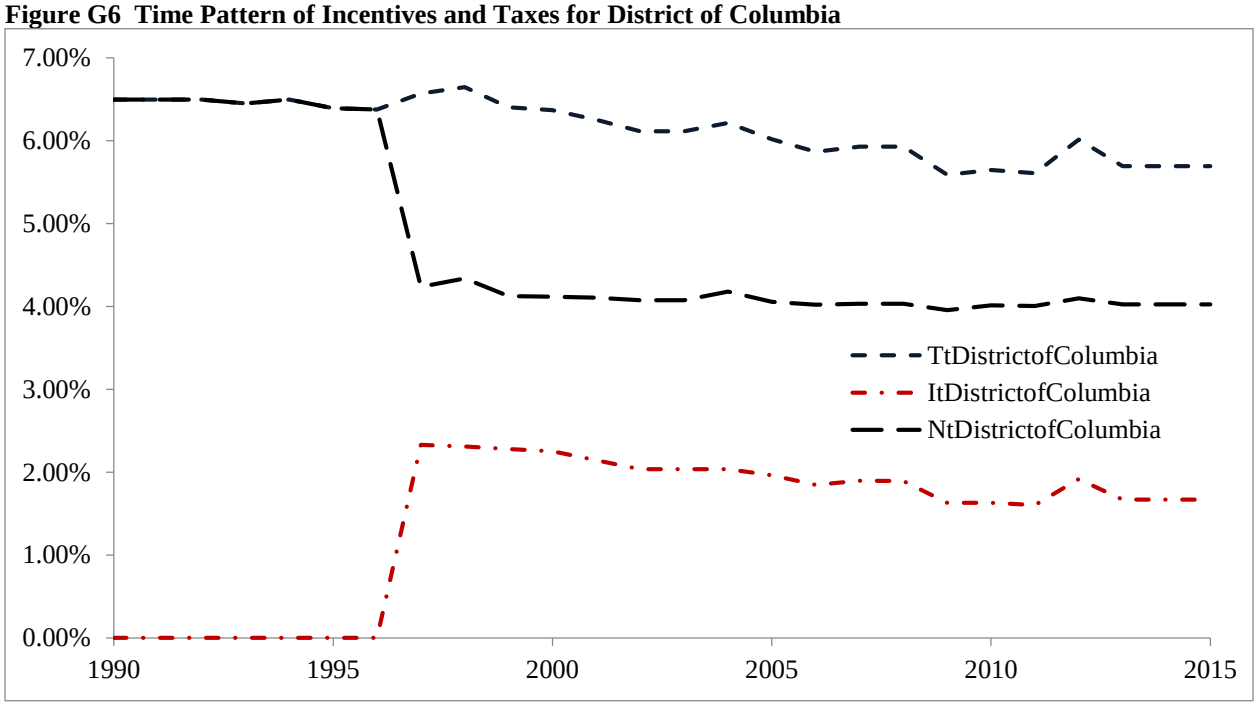

Table G6 Time Pattern of Incentives and Taxes for District of Columbia

Base year	TtDistrictofColumbia	ItDistrictofColumbia	NtDistrictofColumbia
1990	6.50	0.00	6.50
1991	6.50	0.00	6.50
1992	6.50	0.00	6.50
1993	6.45	0.00	6.45
1994	6.50	0.00	6.50
1995	6.39	0.00	6.39
1996	6.38	0.00	6.38
1997	6.57	2.33	4.24
1998	6.65	2.31	4.34
1999	6.41	2.28	4.13
2000	6.37	2.25	4.12
2001	6.25	2.14	4.11
2002	6.11	2.04	4.08
2003	6.11	2.04	4.08
2004	6.22	2.04	4.18
2005	6.02	1.96	4.06
2006	5.87	1.85	4.02
2007	5.93	1.90	4.04
2008	5.93	1.89	4.04
2009	5.59	1.63	3.96
2010	5.65	1.63	4.01
2011	5.61	1.60	4.01
2012	6.02	1.92	4.10
2013	5.69	1.67	4.03
2014	5.69	1.67	4.03
2015	5.69	1.67	4.03

Figure G7 Time Pattern of Incentives and Taxes for Florida

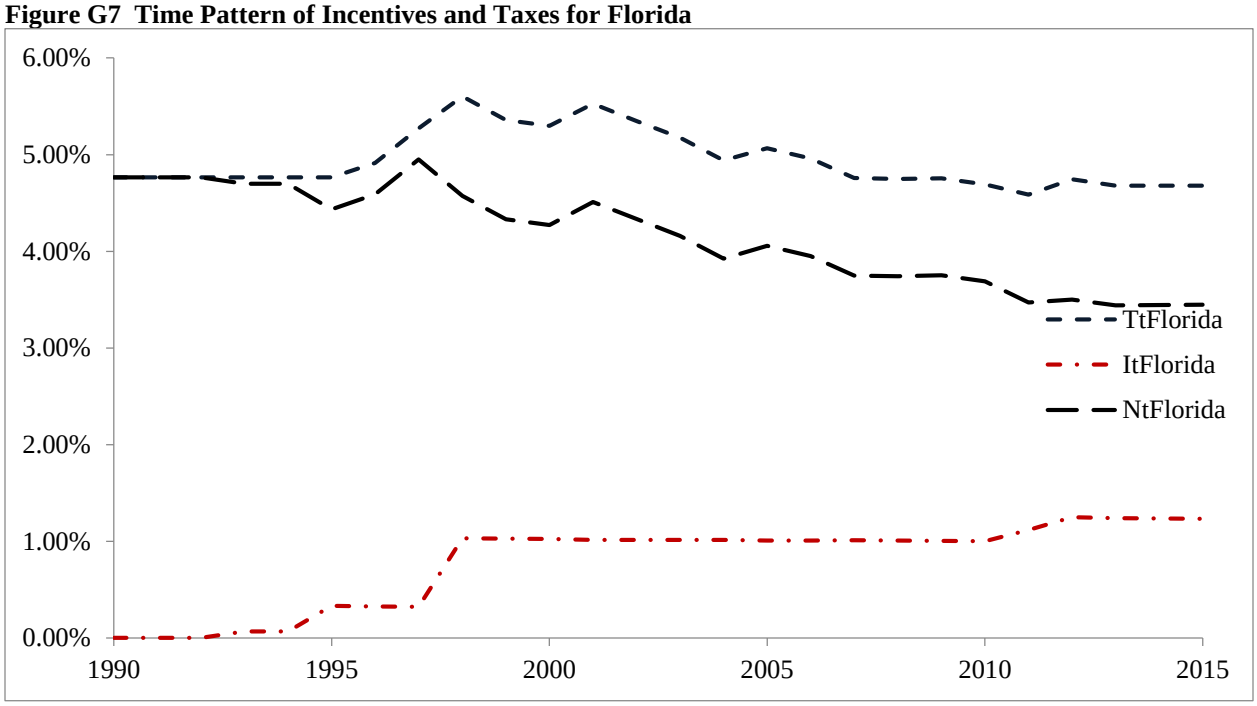

Table G7 Time Pattern of Incentives and Taxes for Florida

Base year	TtFlorida	ItFlorida	NtFlorida
1990	4.76	0.00	4.76
1991	4.76	0.00	4.76
1992	4.76	0.00	4.76
1993	4.77	0.07	4.70
1994	4.77	0.07	4.70
1995	4.77	0.33	4.43
1996	4.92	0.33	4.59
1997	5.27	0.32	4.95
1998	5.60	1.03	4.57
1999	5.36	1.03	4.33
2000	5.30	1.02	4.27
2001	5.53	1.01	4.51
2002	5.35	1.01	4.33
2003	5.17	1.01	4.16
2004	4.94	1.02	3.92
2005	5.07	1.01	4.06
2006	4.96	1.01	3.95
2007	4.76	1.01	3.75
2008	4.75	1.01	3.74
2009	4.76	1.00	3.75
2010	4.69	1.00	3.69
2011	4.59	1.12	3.47
2012	4.75	1.25	3.50
2013	4.68	1.24	3.44
2014	4.68	1.23	3.44
2015	4.68	1.23	3.45

Figure G8 Time Pattern of Incentives and Taxes for Georgia

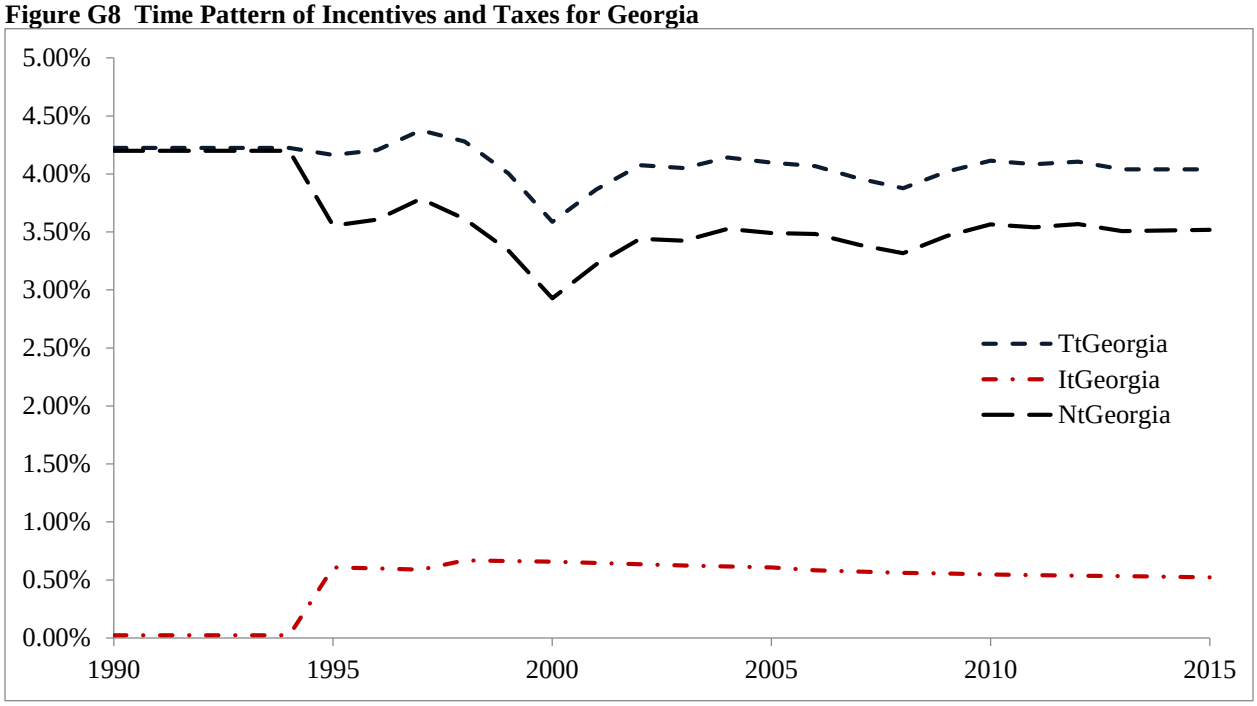

Table G8 Time Pattern of Incentives and Taxes for Georgia

Base year	TtGeorgia	ItGeorgia	NtGeorgia
1990	4.23	0.02	4.20
1991	4.23	0.02	4.20
1992	4.23	0.02	4.20
1993	4.23	0.02	4.20
1994	4.23	0.02	4.20
1995	4.16	0.61	3.55
1996	4.21	0.60	3.61
1997	4.38	0.59	3.79
1998	4.28	0.67	3.61
1999	4.00	0.66	3.34
2000	3.59	0.66	2.93
2001	3.87	0.65	3.22
2002	4.08	0.63	3.44
2003	4.05	0.63	3.43
2004	4.14	0.62	3.53
2005	4.10	0.61	3.49
2006	4.07	0.58	3.48
2007	3.96	0.57	3.39
2008	3.88	0.56	3.32
2009	4.02	0.55	3.47
2010	4.11	0.55	3.57
2011	4.08	0.54	3.54
2012	4.11	0.54	3.57
2013	4.04	0.53	3.51
2014	4.04	0.53	3.51
2015	4.04	0.52	3.52

Figure G9 Time Pattern of Incentives and Taxes for Illinois

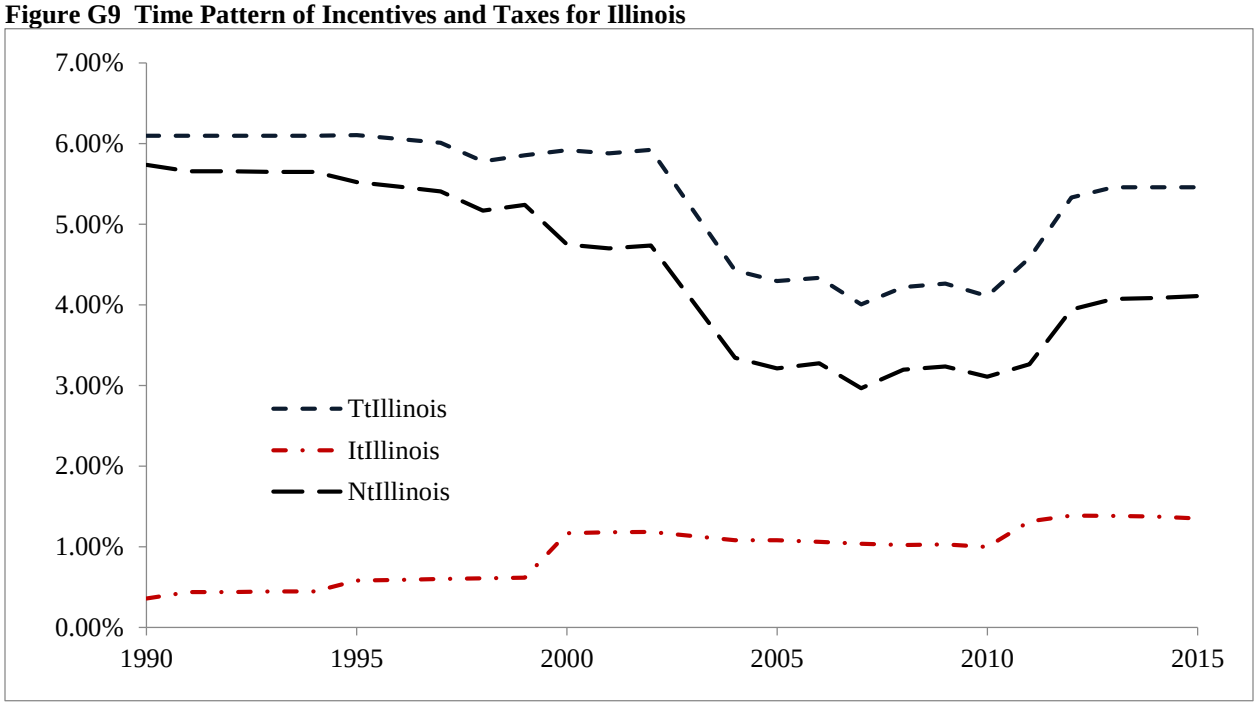

Table G9 Time Pattern of Incentives and Taxes for Illinois

Base year	TtIllinois	ItIllinois	NtIllinois
1990	6.10	0.36	5.74
1991	6.10	0.44	5.66
1992	6.10	0.44	5.66
1993	6.10	0.45	5.65
1994	6.10	0.45	5.65
1995	6.10	0.58	5.52
1996	6.06	0.59	5.47
1997	6.01	0.60	5.41
1998	5.78	0.61	5.17
1999	5.86	0.62	5.24
2000	5.92	1.17	4.75
2001	5.88	1.18	4.70
2002	5.92	1.19	4.74
2003	5.17	1.13	4.04
2004	4.43	1.08	3.34
2005	4.29	1.08	3.21
2006	4.34	1.06	3.28
2007	4.01	1.04	2.97
2008	4.22	1.02	3.20
2009	4.27	1.03	3.24
2010	4.11	1.00	3.11
2011	4.58	1.32	3.27
2012	5.33	1.39	3.94
2013	5.46	1.38	4.08
2014	5.46	1.38	4.08
2015	5.46	1.35	4.11

Figure G10 Time Pattern of Incentives and Taxes for Indiana

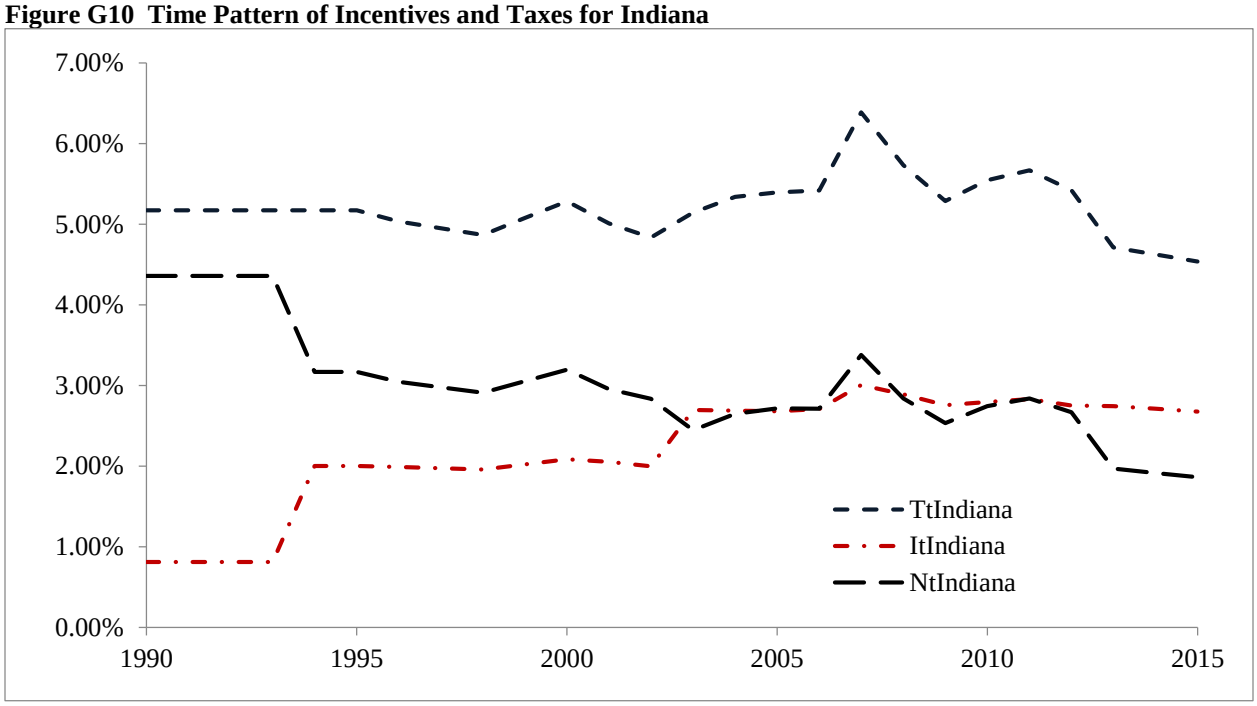

Table G10 Time Pattern of Incentives and Taxes for Indiana

Base year	TtIndiana	ItIndiana	NtIndiana
1990	5.17	0.81	4.36
1991	5.17	0.81	4.36
1992	5.17	0.81	4.36
1993	5.17	0.81	4.36
1994	5.17	2.00	3.17
1995	5.17	2.00	3.17
1996	5.03	1.99	3.04
1997	4.95	1.97	2.98
1998	4.87	1.96	2.91
1999	5.08	2.02	3.05
2000	5.28	2.09	3.20
2001	5.01	2.05	2.96
2002	4.84	2.00	2.84
2003	5.15	2.70	2.45
2004	5.34	2.69	2.65
2005	5.39	2.68	2.72
2006	5.42	2.71	2.71
2007	6.39	3.01	3.38
2008	5.73	2.89	2.84
2009	5.29	2.76	2.53
2010	5.54	2.80	2.75
2011	5.67	2.83	2.84
2012	5.42	2.75	2.67
2013	4.71	2.74	1.97
2014	4.63	2.71	1.91
2015	4.54	2.68	1.86

Figure G11 Time Pattern of Incentives and Taxes for Iowa

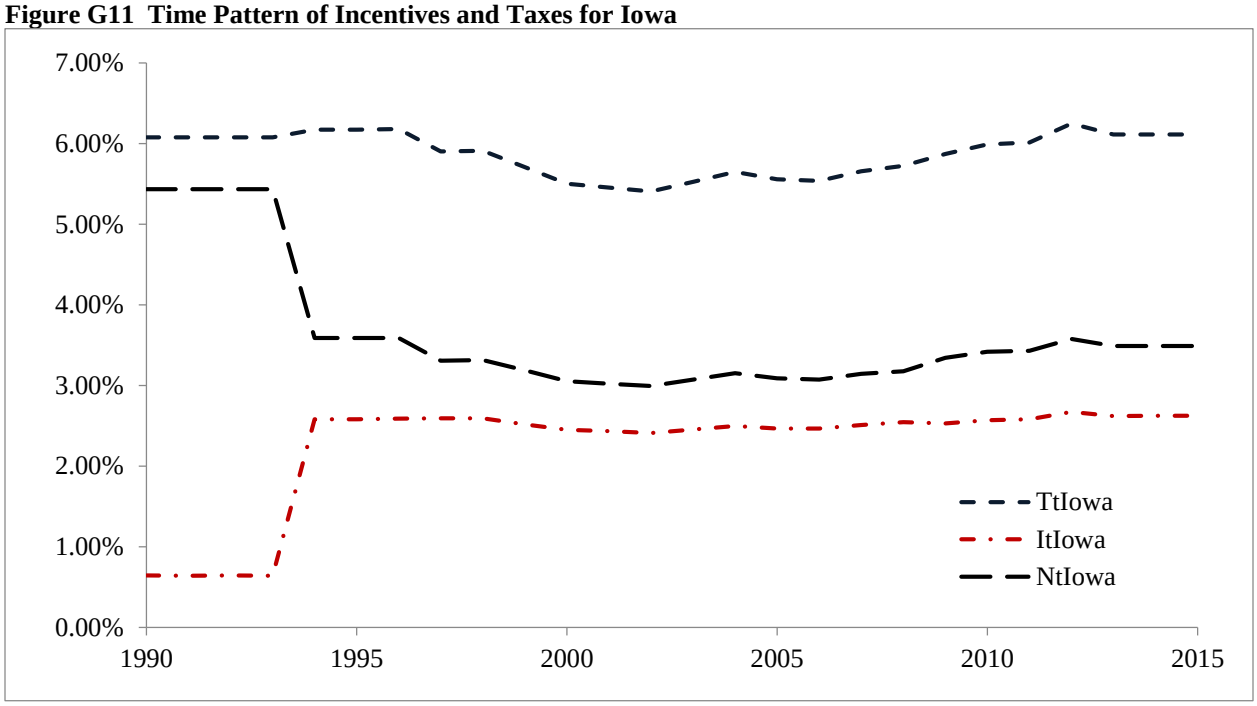

Table G11 Time Pattern of Incentives and Taxes for Iowa

Base year	TtIowa	ItIowa	NtIowa
1990	6.08	0.64	5.43
1991	6.08	0.64	5.43
1992	6.08	0.64	5.43
1993	6.08	0.64	5.43
1994	6.17	2.58	3.59
1995	6.17	2.58	3.59
1996	6.18	2.59	3.59
1997	5.90	2.59	3.31
1998	5.91	2.59	3.32
1999	5.71	2.52	3.19
2000	5.50	2.45	3.05
2001	5.45	2.43	3.02
2002	5.40	2.41	2.99
2003	5.53	2.45	3.07
2004	5.65	2.50	3.15
2005	5.56	2.47	3.09
2006	5.54	2.47	3.07
2007	5.66	2.51	3.14
2008	5.72	2.55	3.18
2009	5.87	2.53	3.34
2010	5.99	2.57	3.42
2011	6.01	2.58	3.43
2012	6.25	2.67	3.58
2013	6.11	2.62	3.49
2014	6.11	2.62	3.49
2015	6.11	2.62	3.49

Figure G12 Time Pattern of Incentives and Taxes for Kentucky

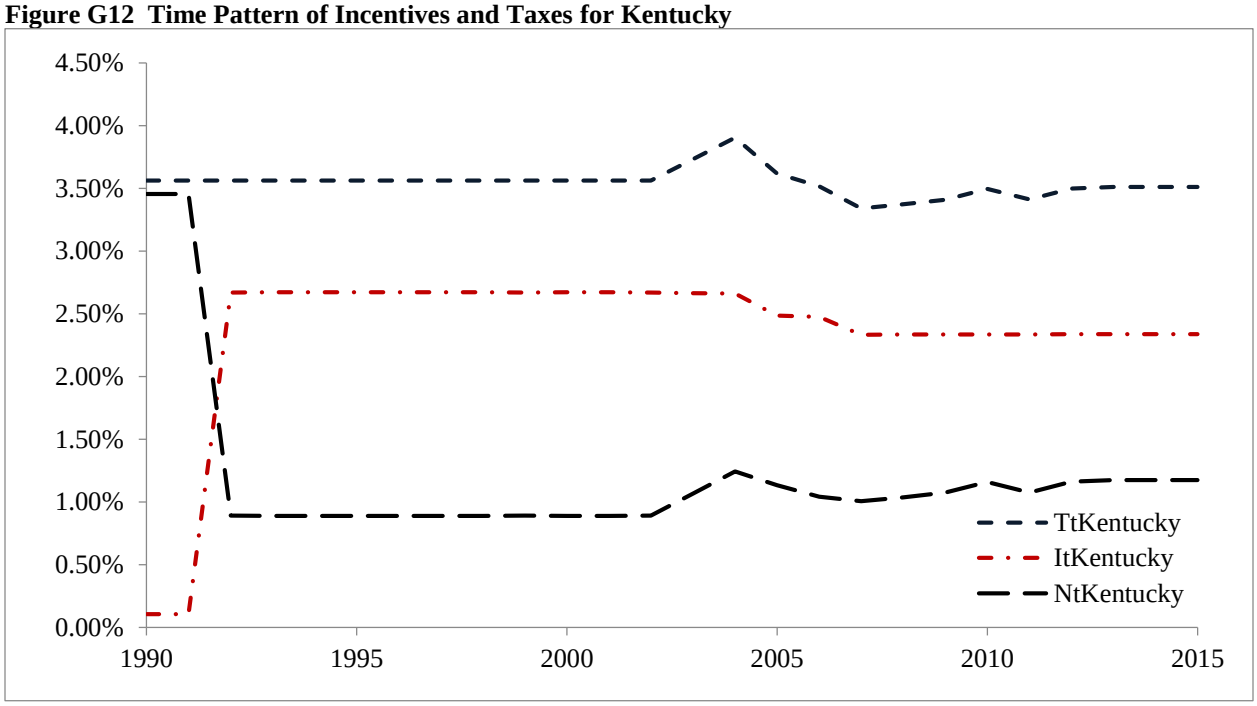

Table G12 Time Pattern of Incentives and Taxes for Kentucky

Base year	TtKentucky	ItKentucky	NtKentucky
1990	3.56	0.11	3.46
1991	3.56	0.11	3.46
1992	3.56	2.67	0.89
1993	3.56	2.67	0.89
1994	3.56	2.67	0.89
1995	3.56	2.67	0.89
1996	3.56	2.67	0.89
1997	3.56	2.67	0.89
1998	3.56	2.67	0.89
1999	3.56	2.67	0.89
2000	3.56	2.67	0.89
2001	3.56	2.67	0.89
2002	3.56	2.67	0.89
2003	3.73	2.67	1.07
2004	3.91	2.66	1.24
2005	3.62	2.49	1.13
2006	3.52	2.48	1.04
2007	3.34	2.33	1.01
2008	3.37	2.34	1.04
2009	3.41	2.33	1.08
2010	3.50	2.34	1.16
2011	3.41	2.34	1.08
2012	3.50	2.34	1.16
2013	3.51	2.34	1.17
2014	3.51	2.34	1.17
2015	3.51	2.34	1.17

Figure G13 Time Pattern of Incentives and Taxes for Louisiana

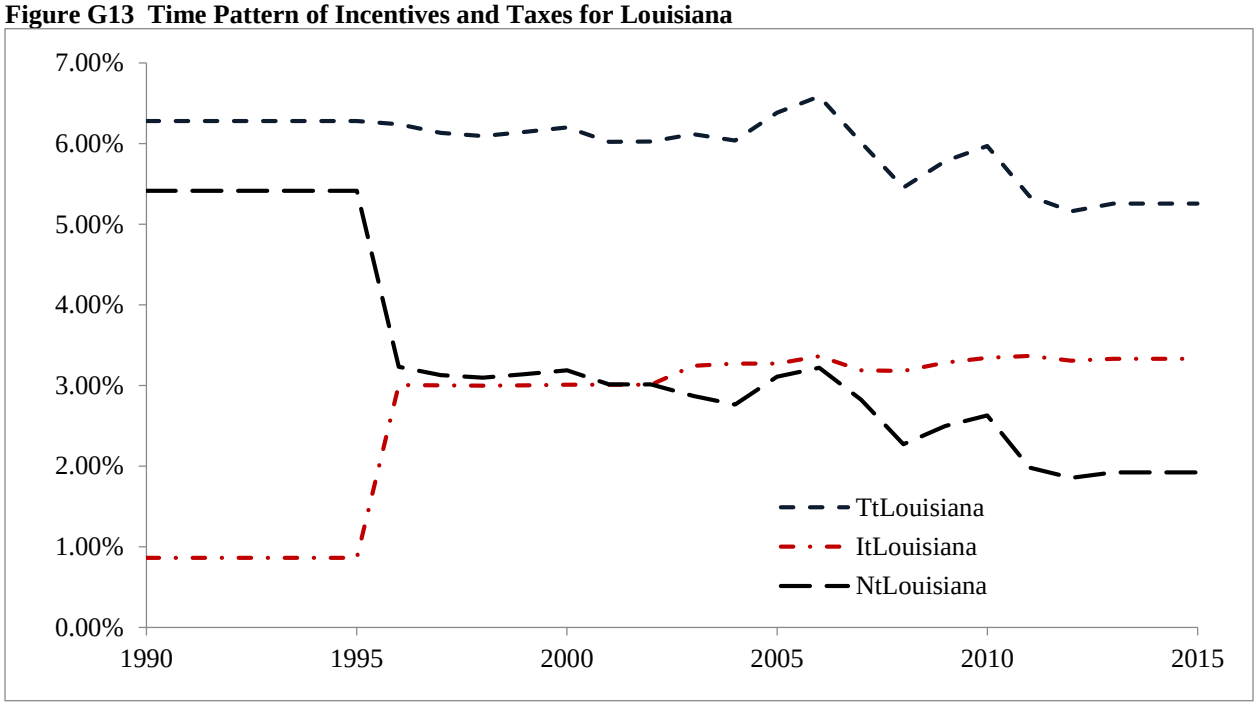

Table G13 Time Pattern of Incentives and Taxes for Louisiana

Base year	TtLouisiana	ItLouisiana	NtLouisiana
1990	6.28	0.86	5.41
1991	6.28	0.86	5.41
1992	6.28	0.86	5.41
1993	6.28	0.86	5.41
1994	6.28	0.86	5.41
1995	6.28	0.86	5.41
1996	6.24	3.01	3.23
1997	6.13	3.00	3.13
1998	6.09	3.00	3.10
1999	6.14	3.00	3.14
2000	6.20	3.01	3.19
2001	6.02	3.01	3.01
2002	6.03	3.01	3.01
2003	6.12	3.25	2.87
2004	6.04	3.27	2.76
2005	6.38	3.27	3.11
2006	6.58	3.36	3.22
2007	6.01	3.19	2.82
2008	5.45	3.18	2.27
2009	5.78	3.28	2.50
2010	5.97	3.34	2.63
2011	5.35	3.37	1.98
2012	5.16	3.31	1.85
2013	5.26	3.33	1.92
2014	5.26	3.33	1.92
2015	5.26	3.33	1.92

Figure G14 Time Pattern of Incentives and Taxes for Maryland

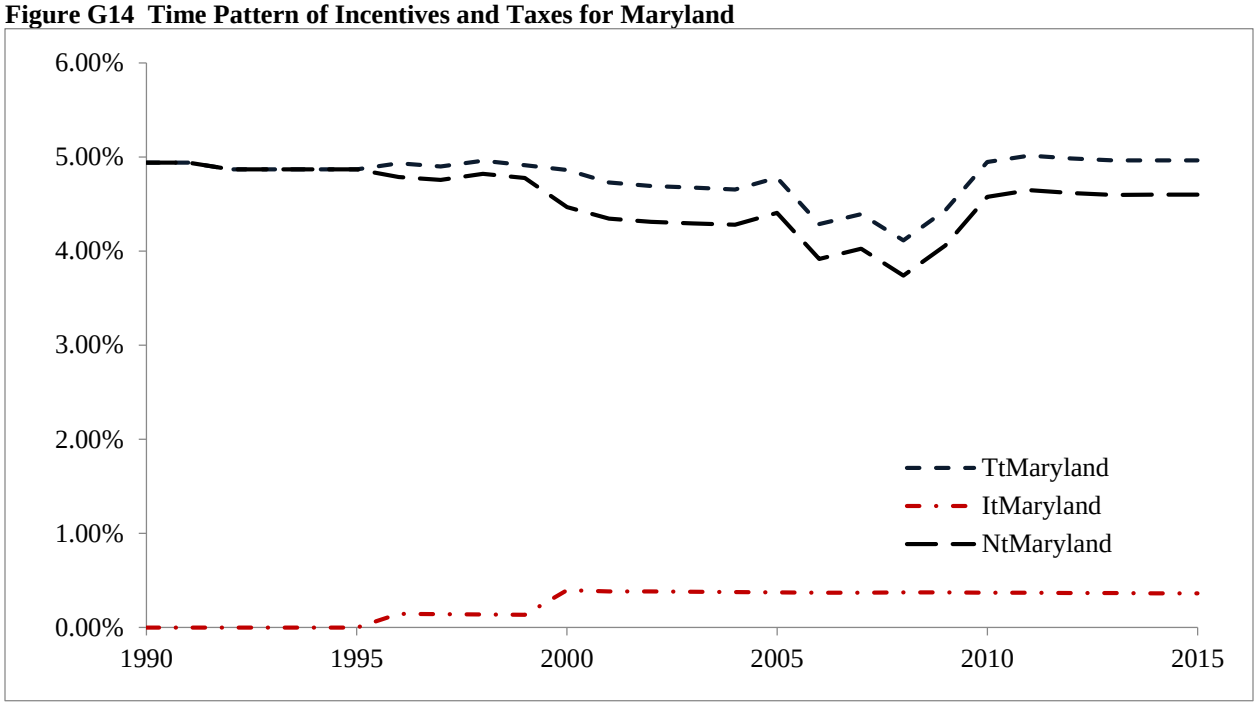

Table G14 Time Pattern of Incentives and Taxes for Maryland

Base year	TtMaryland	ItMaryland	NtMaryland
1990	4.94	0.00	4.94
1991	4.94	0.00	4.94
1992	4.87	0.00	4.87
1993	4.87	0.00	4.87
1994	4.87	0.00	4.87
1995	4.87	0.00	4.87
1996	4.93	0.15	4.79
1997	4.90	0.14	4.76
1998	4.96	0.14	4.82
1999	4.91	0.14	4.78
2000	4.86	0.40	4.47
2001	4.73	0.38	4.34
2002	4.69	0.38	4.31
2003	4.67	0.38	4.29
2004	4.66	0.38	4.28
2005	4.78	0.37	4.41
2006	4.29	0.37	3.91
2007	4.39	0.37	4.02
2008	4.11	0.37	3.74
2009	4.43	0.37	4.06
2010	4.95	0.37	4.58
2011	5.01	0.37	4.65
2012	4.98	0.37	4.62
2013	4.96	0.37	4.60
2014	4.96	0.36	4.60
2015	4.96	0.36	4.60

Figure G15 Time Pattern of Incentives and Taxes for Massachusetts

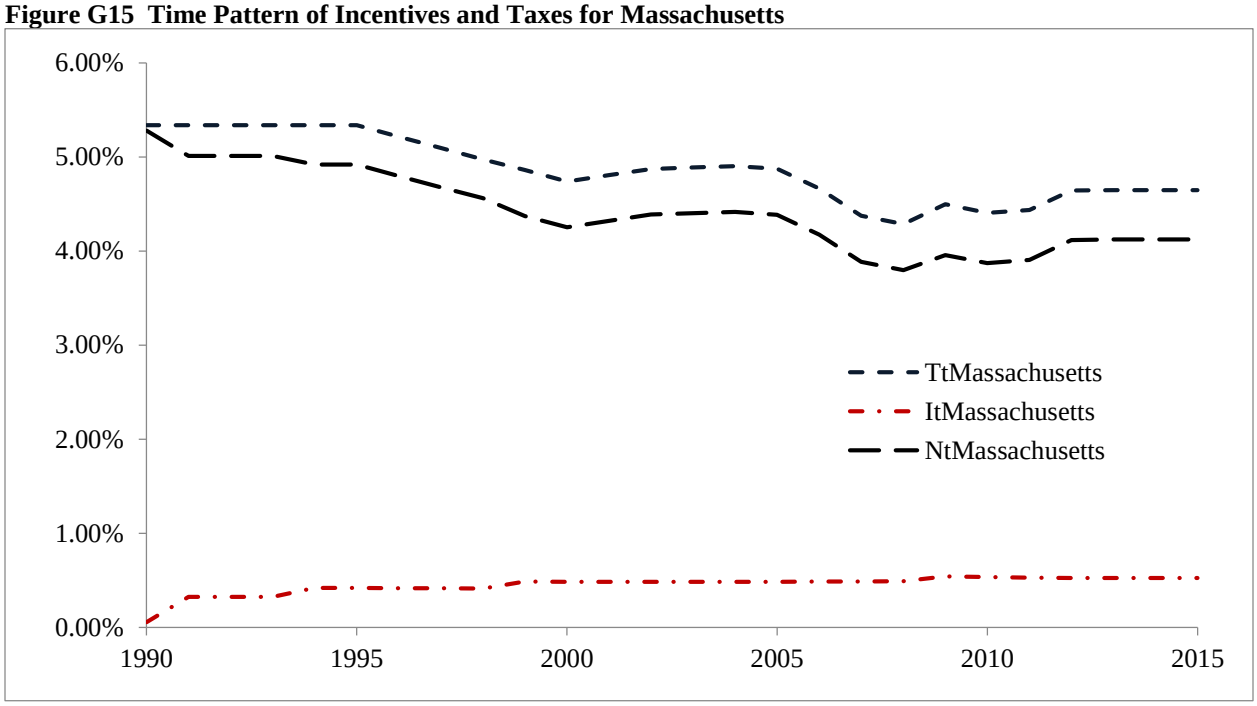

Table G15 Time Pattern of Incentives and Taxes for Massachusetts

Base year	TtMassachusetts	ItMassachusetts	NtMassachusetts
1990	5.34	0.06	5.28
1991	5.34	0.33	5.01
1992	5.34	0.33	5.01
1993	5.34	0.33	5.01
1994	5.34	0.42	4.92
1995	5.34	0.42	4.92
1996	5.22	0.42	4.80
1997	5.10	0.42	4.68
1998	4.97	0.41	4.56
1999	4.86	0.49	4.37
2000	4.74	0.49	4.25
2001	4.81	0.49	4.32
2002	4.87	0.48	4.39
2003	4.89	0.49	4.40
2004	4.90	0.49	4.42
2005	4.87	0.49	4.39
2006	4.66	0.49	4.18
2007	4.38	0.49	3.89
2008	4.29	0.49	3.80
2009	4.50	0.54	3.96
2010	4.41	0.53	3.87
2011	4.44	0.53	3.91
2012	4.64	0.53	4.12
2013	4.65	0.53	4.12
2014	4.65	0.53	4.12
2015	4.65	0.53	4.12

Figure G16 Time Pattern of Incentives and Taxes for Michigan

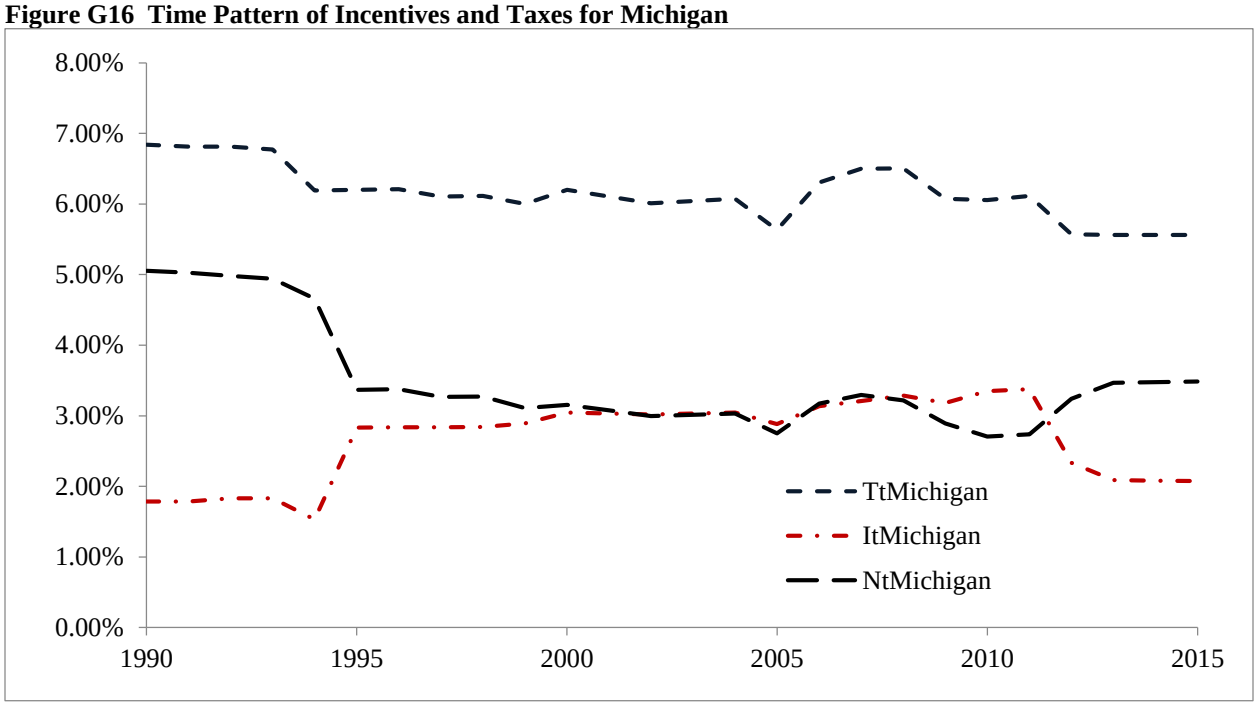

Table G16 Time Pattern of Incentives and Taxes for Michigan

Base year	TtMichigan	ItMichigan	NtMichigan
1990	6.84	1.79	5.05
1991	6.81	1.79	5.03
1992	6.81	1.83	4.98
1993	6.77	1.83	4.94
1994	6.19	1.53	4.66
1995	6.20	2.83	3.37
1996	6.21	2.84	3.38
1997	6.10	2.84	3.27
1998	6.11	2.84	3.27
1999	6.00	2.89	3.11
2000	6.20	3.05	3.16
2001	6.11	3.03	3.08
2002	6.01	3.02	2.99
2003	6.04	3.03	3.01
2004	6.07	3.04	3.03
2005	5.63	2.88	2.75
2006	6.30	3.13	3.17
2007	6.50	3.21	3.29
2008	6.51	3.29	3.22
2009	6.08	3.18	2.89
2010	6.06	3.35	2.70
2011	6.11	3.37	2.74
2012	5.57	2.33	3.24
2013	5.56	2.09	3.47
2014	5.56	2.08	3.48
2015	5.56	2.07	3.49

Figure G17 Time Pattern of Incentives and Taxes for Minnesota

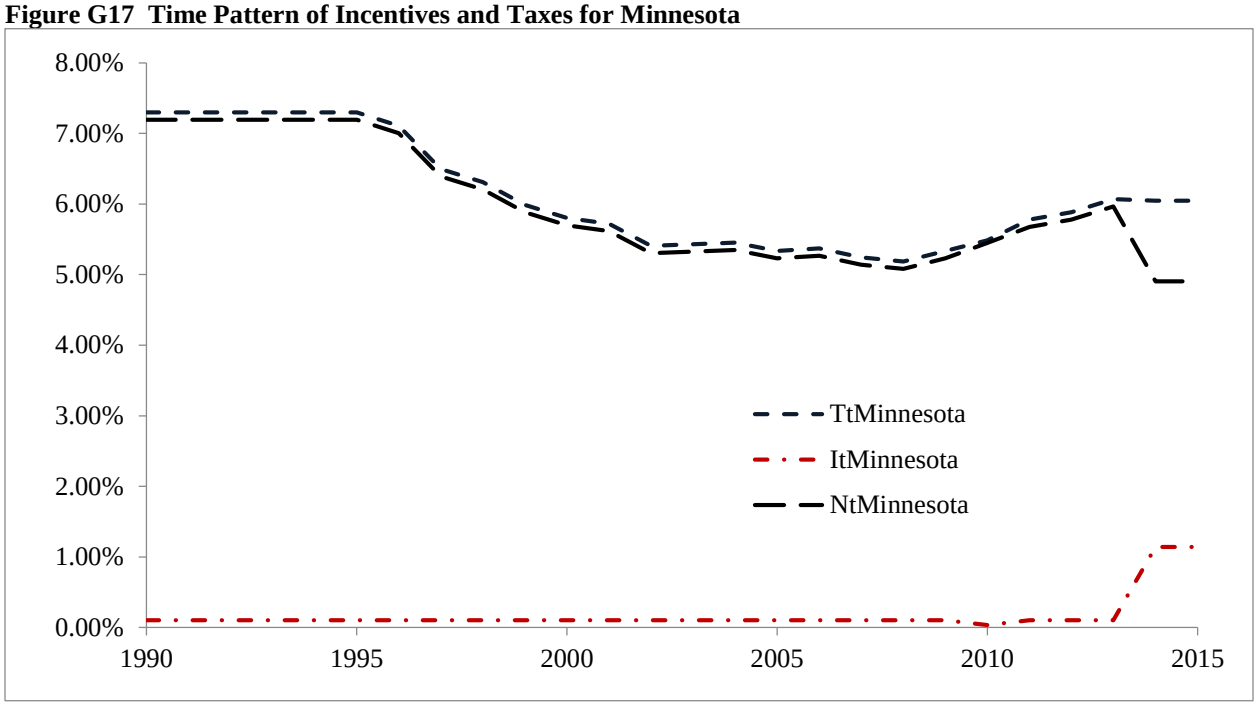

Table G17 Time Pattern of Incentives and Taxes for Minnesota

Base year	TtMinnesota	ItMinnesota	NtMinnesota
1990	7.30	0.10	7.19
1991	7.30	0.10	7.19
1992	7.30	0.10	7.19
1993	7.30	0.10	7.19
1994	7.30	0.10	7.19
1995	7.30	0.10	7.19
1996	7.11	0.10	7.00
1997	6.50	0.10	6.39
1998	6.31	0.10	6.20
1999	5.99	0.10	5.88
2000	5.80	0.10	5.70
2001	5.72	0.10	5.62
2002	5.41	0.10	5.30
2003	5.43	0.10	5.33
2004	5.46	0.10	5.35
2005	5.33	0.10	5.23
2006	5.37	0.10	5.27
2007	5.24	0.10	5.14
2008	5.19	0.10	5.08
2009	5.33	0.10	5.23
2010	5.48	0.04	5.45
2011	5.78	0.10	5.67
2012	5.89	0.10	5.78
2013	6.07	0.10	5.96
2014	6.05	1.14	4.90
2015	6.05	1.14	4.90

Figure G18 Time Pattern of Incentives and Taxes for Missouri

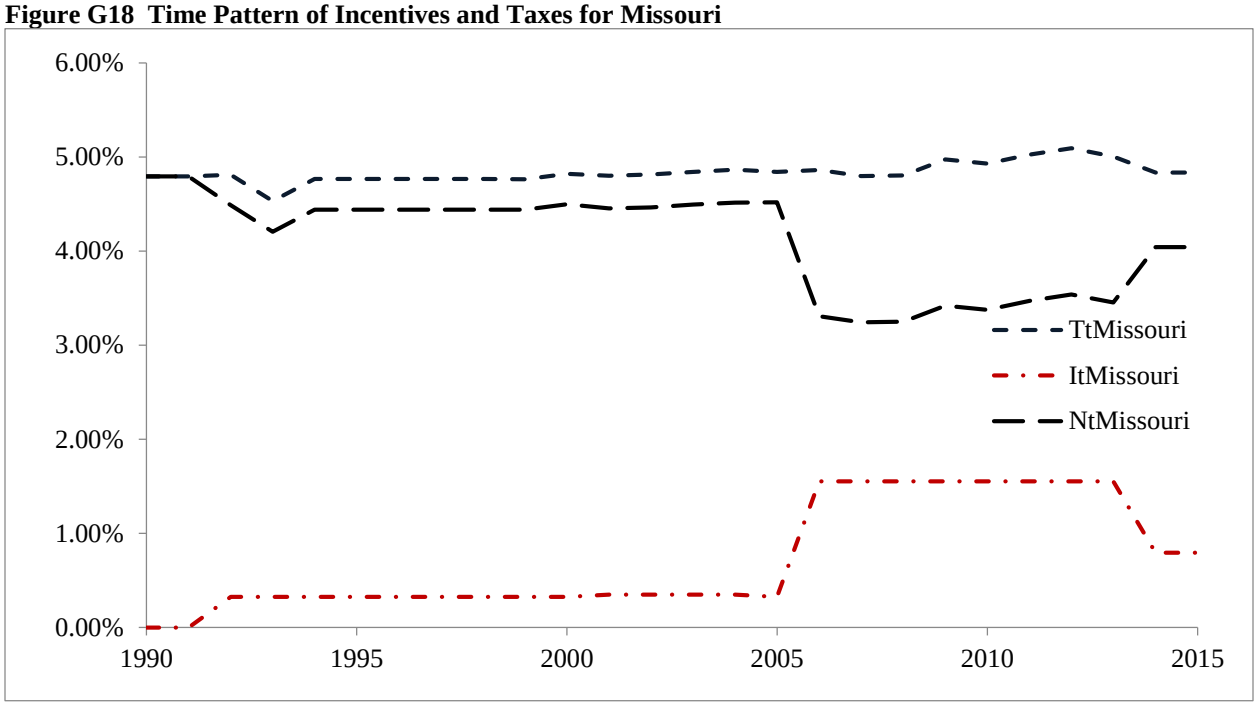

Table G18 Time Pattern of Incentives and Taxes for Missouri

Base year	TtMissouri	ItMissouri	NtMissouri
1990	4.79	0.00	4.79
1991	4.79	0.00	4.79
1992	4.81	0.32	4.49
1993	4.53	0.32	4.21
1994	4.76	0.32	4.44
1995	4.76	0.32	4.44
1996	4.76	0.32	4.44
1997	4.76	0.32	4.44
1998	4.76	0.32	4.44
1999	4.76	0.32	4.44
2000	4.82	0.32	4.50
2001	4.80	0.35	4.45
2002	4.81	0.35	4.46
2003	4.84	0.35	4.49
2004	4.86	0.35	4.51
2005	4.84	0.32	4.52
2006	4.86	1.55	3.31
2007	4.80	1.55	3.24
2008	4.80	1.55	3.25
2009	4.97	1.55	3.42
2010	4.93	1.55	3.38
2011	5.02	1.55	3.47
2012	5.09	1.55	3.54
2013	5.01	1.55	3.45
2014	4.84	0.79	4.04
2015	4.84	0.79	4.04

Figure G19 Time Pattern of Incentives and Taxes for Nebraska

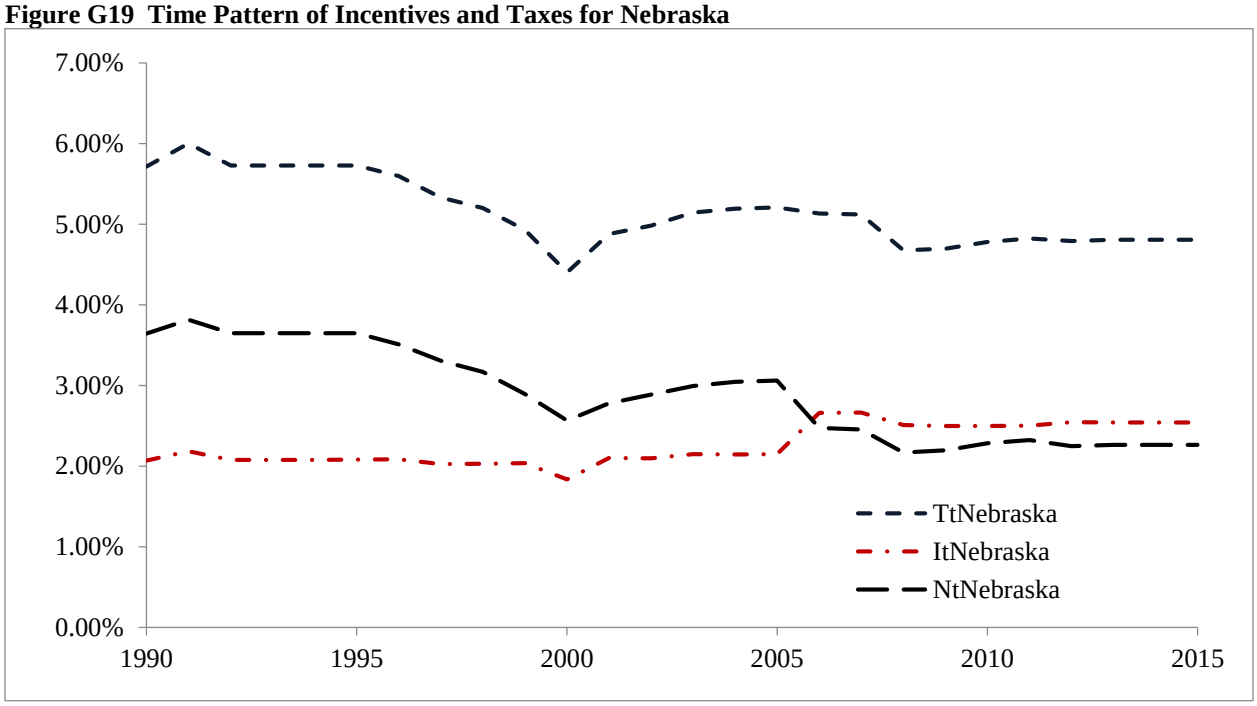

Table G19 Time Pattern of Incentives and Taxes for Nebraska

Base year	TtNebraska	ItNebraska	NtNebraska
1990	5.72	2.07	3.65
1991	6.00	2.19	3.81
1992	5.73	2.08	3.65
1993	5.73	2.08	3.65
1994	5.73	2.08	3.65
1995	5.73	2.08	3.65
1996	5.59	2.09	3.51
1997	5.33	2.03	3.31
1998	5.20	2.03	3.17
1999	4.93	2.04	2.89
2000	4.40	1.84	2.57
2001	4.88	2.10	2.78
2002	4.98	2.10	2.89
2003	5.14	2.15	3.00
2004	5.19	2.15	3.04
2005	5.21	2.15	3.06
2006	5.13	2.66	2.47
2007	5.12	2.66	2.46
2008	4.68	2.51	2.17
2009	4.70	2.50	2.20
2010	4.78	2.50	2.28
2011	4.82	2.50	2.32
2012	4.79	2.54	2.25
2013	4.81	2.54	2.26
2014	4.81	2.54	2.26
2015	4.81	2.54	2.26

Figure G20 Time Pattern of Incentives and Taxes for Nevada

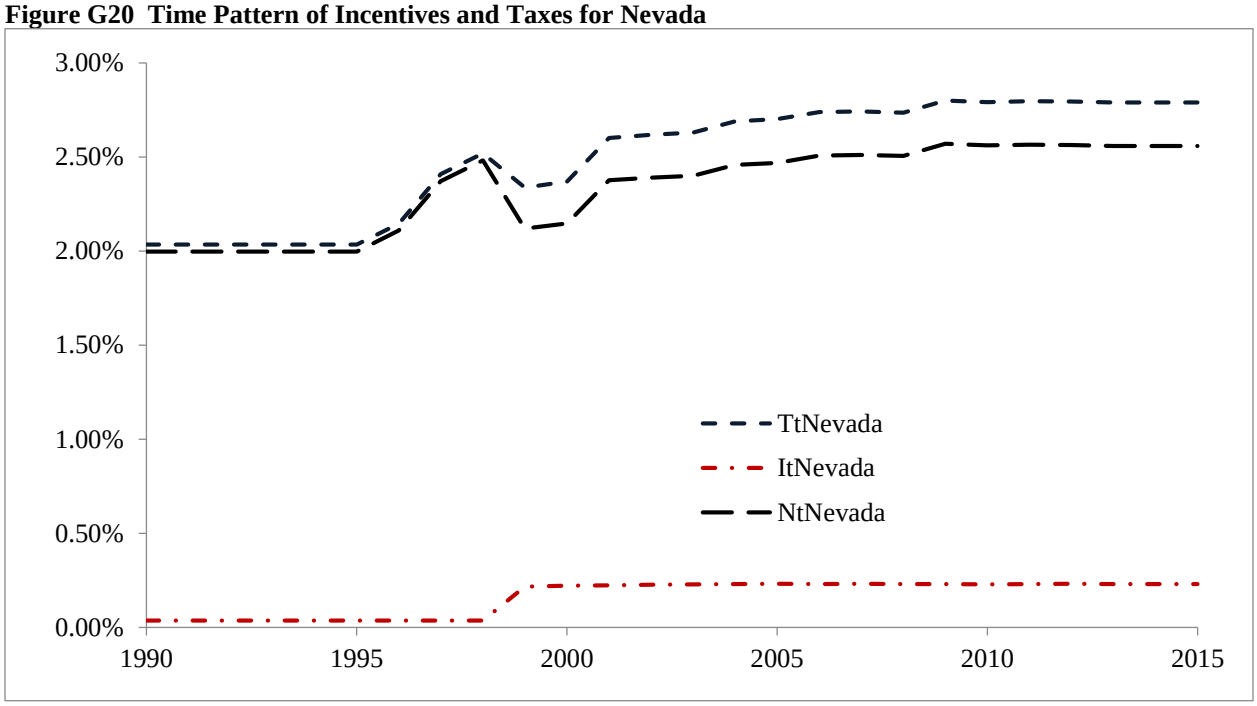

Table G20 Time Pattern of Incentives and Taxes for Nevada

Base year	TtNevada	ItNevada	NtNevada
1990	2.03	0.04	2.00
1991	2.03	0.04	2.00
1992	2.03	0.04	2.00
1993	2.03	0.04	2.00
1994	2.03	0.04	2.00
1995	2.03	0.04	2.00
1996	2.15	0.04	2.11
1997	2.41	0.04	2.37
1998	2.52	0.04	2.48
1999	2.34	0.22	2.12
2000	2.37	0.22	2.15
2001	2.60	0.22	2.38
2002	2.62	0.23	2.39
2003	2.63	0.23	2.40
2004	2.69	0.23	2.46
2005	2.70	0.23	2.47
2006	2.74	0.23	2.51
2007	2.74	0.23	2.51
2008	2.74	0.23	2.50
2009	2.80	0.23	2.57
2010	2.79	0.23	2.56
2011	2.80	0.23	2.57
2012	2.80	0.23	2.56
2013	2.79	0.23	2.56
2014	2.79	0.23	2.56
2015	2.79	0.23	2.56

Figure G21 Time Pattern of Incentives and Taxes for New Jersey

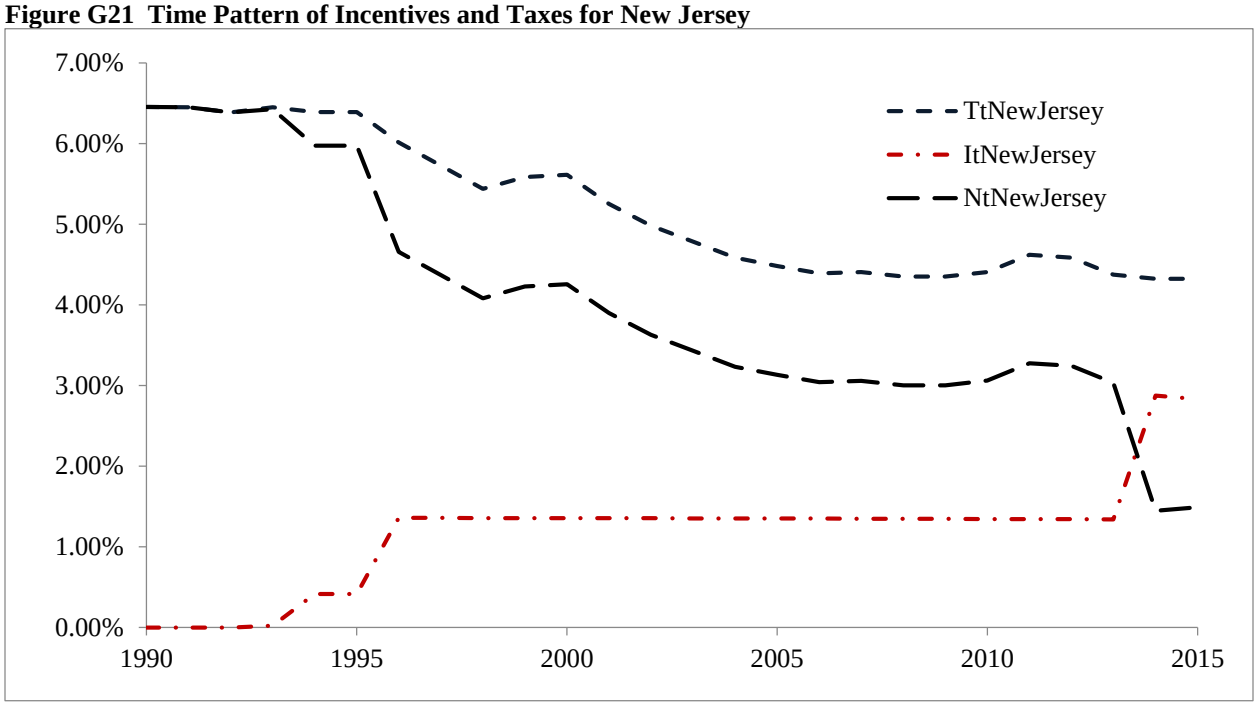

Table G21 Time Pattern of Incentives and Taxes for New Jersey

Base year	TtNewJersey	ItNewJersey	NtNewJersey
1990	6.45	0.00	6.45
1991	6.45	0.00	6.45
1992	6.39	0.00	6.39
1993	6.45	0.02	6.43
1994	6.39	0.42	5.97
1995	6.39	0.42	5.97
1996	6.02	1.36	4.66
1997	5.73	1.36	4.37
1998	5.44	1.36	4.08
1999	5.58	1.36	4.23
2000	5.61	1.35	4.26
2001	5.25	1.35	3.90
2002	4.98	1.35	3.63
2003	4.78	1.35	3.43
2004	4.58	1.35	3.23
2005	4.48	1.35	3.13
2006	4.39	1.35	3.04
2007	4.41	1.35	3.06
2008	4.35	1.35	3.00
2009	4.35	1.35	3.00
2010	4.41	1.35	3.06
2011	4.62	1.34	3.28
2012	4.59	1.34	3.24
2013	4.37	1.34	3.03
2014	4.32	2.87	1.45
2015	4.32	2.83	1.49

Figure G22 Time Pattern of Incentives and Taxes for New Mexico

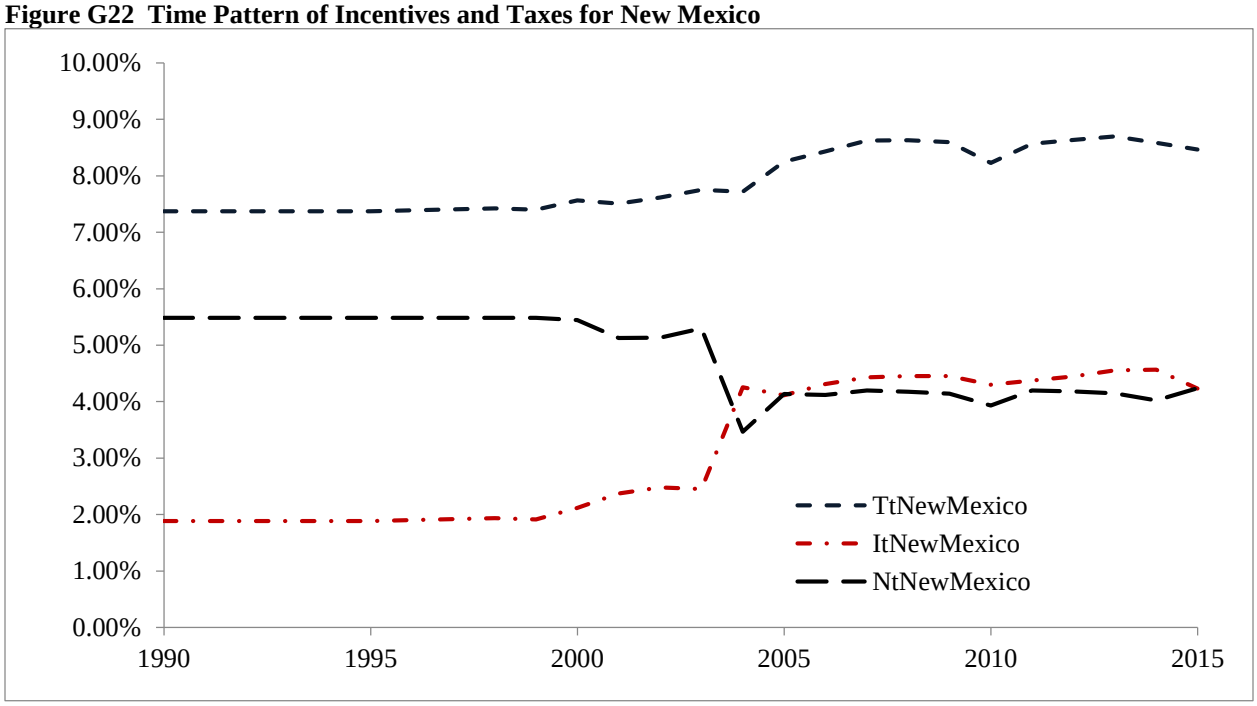

Table G22 Time Pattern of Incentives and Taxes for New Mexico

Base year	TtNewMexico	ItNewMexico	NtNewMexico
1990	7.37	1.89	5.48
1991	7.37	1.89	5.48
1992	7.37	1.89	5.48
1993	7.37	1.89	5.48
1994	7.37	1.89	5.48
1995	7.37	1.89	5.48
1996	7.39	1.90	5.48
1997	7.41	1.92	5.48
1998	7.42	1.94	5.48
1999	7.40	1.92	5.48
2000	7.56	2.12	5.44
2001	7.51	2.38	5.13
2002	7.61	2.48	5.13
2003	7.75	2.45	5.30
2004	7.72	4.25	3.47
2005	8.25	4.11	4.14
2006	8.43	4.31	4.12
2007	8.63	4.43	4.20
2008	8.63	4.45	4.18
2009	8.59	4.45	4.14
2010	8.23	4.30	3.93
2011	8.57	4.37	4.20
2012	8.63	4.45	4.18
2013	8.70	4.55	4.15
2014	8.58	4.57	4.02
2015	8.47	4.23	4.23

Figure G23 Time Pattern of Incentives and Taxes for New York

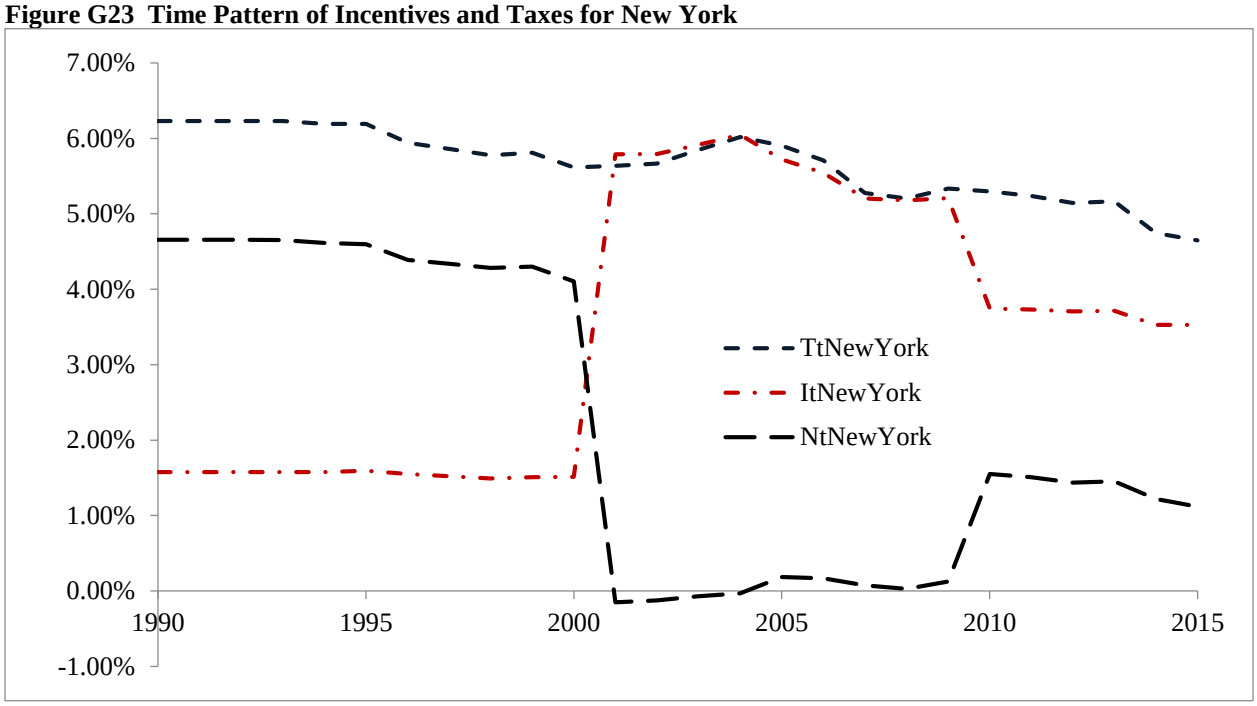

Table G23 Time Pattern of Incentives and Taxes for New York

Base year	TtNewYork	ItNewYork	NtNewYork
1990	6.23	1.58	4.66
1991	6.23	1.58	4.65
1992	6.23	1.58	4.65
1993	6.23	1.58	4.65
1994	6.19	1.58	4.61
1995	6.19	1.59	4.60
1996	5.94	1.55	4.39
1997	5.86	1.52	4.34
1998	5.78	1.49	4.28
1999	5.81	1.51	4.30
2000	5.62	1.51	4.10
2001	5.64	5.79	-0.15
2002	5.67	5.79	-0.13
2003	5.85	5.92	-0.07
2004	6.02	6.05	-0.03
2005	5.90	5.72	0.18
2006	5.71	5.54	0.17
2007	5.28	5.20	0.07
2008	5.20	5.18	0.03
2009	5.33	5.21	0.13
2010	5.29	3.74	1.55
2011	5.24	3.73	1.51
2012	5.14	3.71	1.44
2013	5.16	3.71	1.45
2014	4.75	3.53	1.22
2015	4.65	3.53	1.12

Figure G24 Time Pattern of Incentives and Taxes for North Carolina

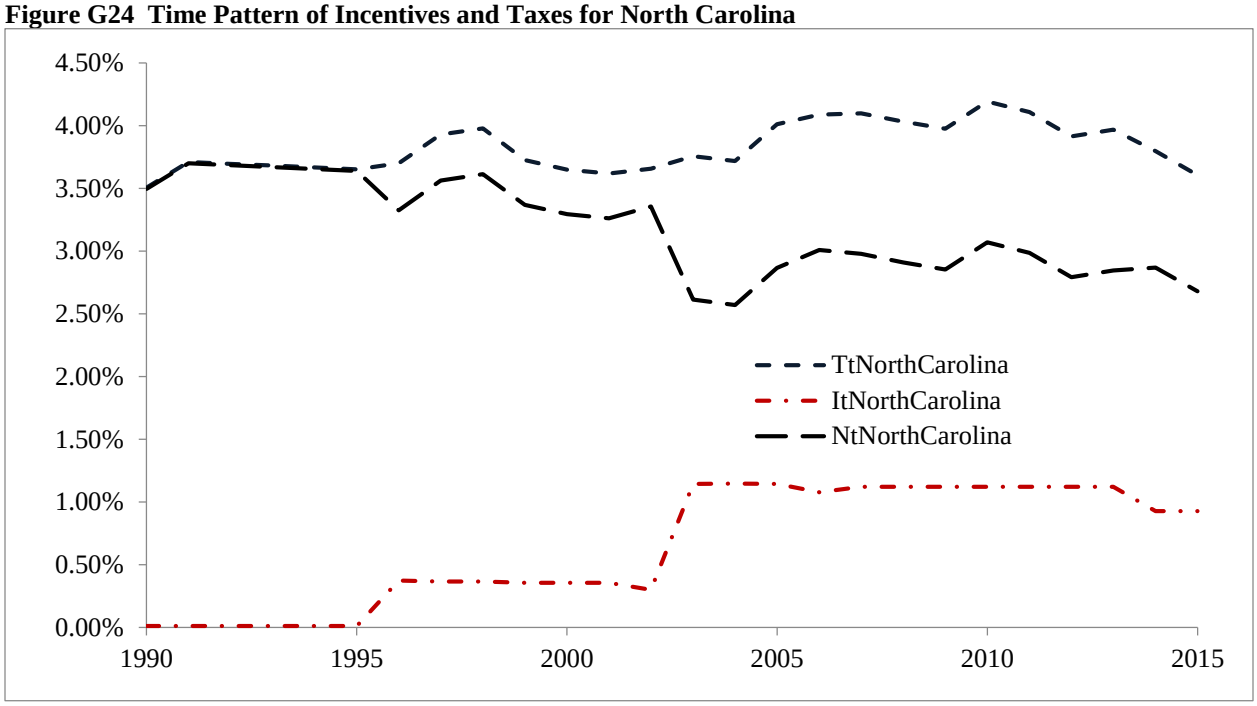

Table G24 Time Pattern of Incentives and Taxes for North Carolina

Base year	TtNorthCarolina	ItNorthCarolina	NtNorthCarolina
1990	3.51	0.01	3.49
1991	3.71	0.01	3.70
1992	3.70	0.01	3.68
1993	3.68	0.01	3.67
1994	3.67	0.01	3.65
1995	3.65	0.01	3.64
1996	3.70	0.38	3.32
1997	3.93	0.37	3.56
1998	3.98	0.37	3.61
1999	3.72	0.36	3.37
2000	3.65	0.36	3.29
2001	3.62	0.36	3.26
2002	3.66	0.30	3.36
2003	3.76	1.14	2.61
2004	3.72	1.15	2.57
2005	4.01	1.14	2.87
2006	4.09	1.08	3.01
2007	4.10	1.12	2.98
2008	4.03	1.12	2.91
2009	3.97	1.12	2.85
2010	4.19	1.12	3.07
2011	4.11	1.12	2.99
2012	3.91	1.12	2.79
2013	3.97	1.12	2.85
2014	3.80	0.93	2.87
2015	3.61	0.93	2.68

Figure G25 Time Pattern of Incentives and Taxes for Ohio

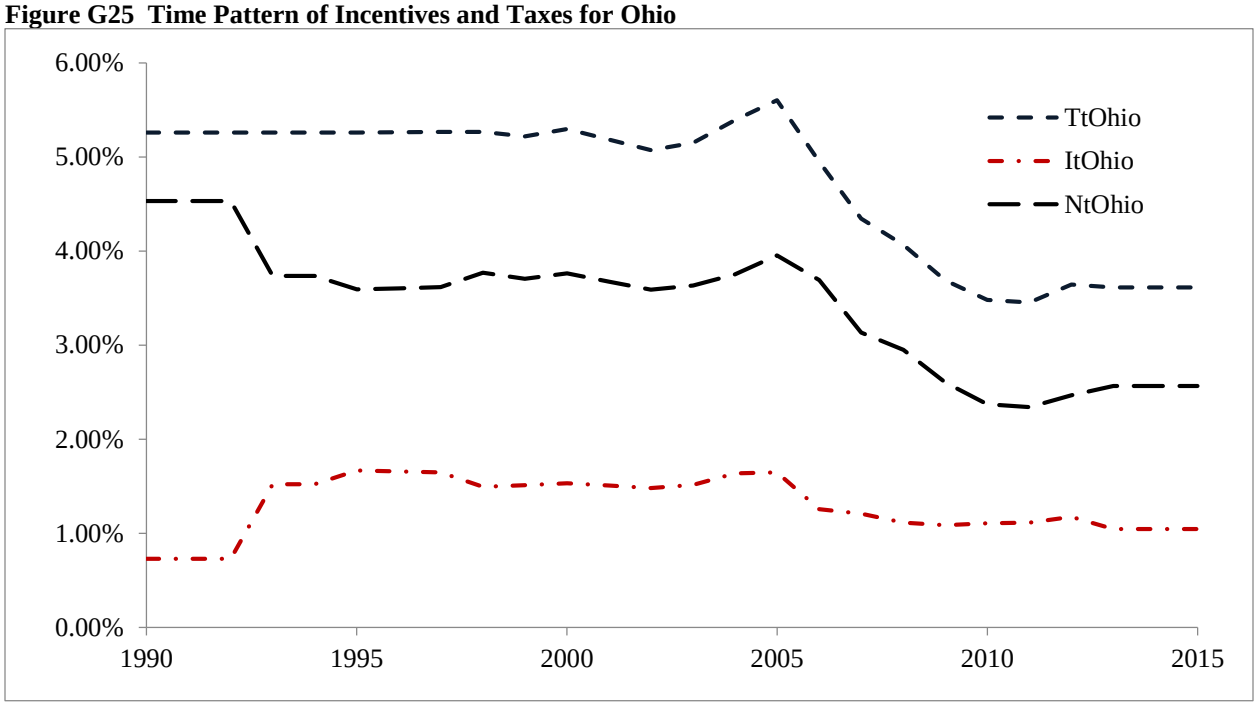

Table G25 Time Pattern of Incentives and Taxes for Ohio

Base year	TtOhio	ItOhio	NtOhio
1990	5.26	0.73	4.53
1991	5.26	0.73	4.53
1992	5.26	0.73	4.53
1993	5.26	1.52	3.74
1994	5.26	1.52	3.74
1995	5.26	1.67	3.59
1996	5.26	1.66	3.60
1997	5.26	1.65	3.62
1998	5.27	1.50	3.77
1999	5.22	1.51	3.71
2000	5.30	1.53	3.76
2001	5.18	1.51	3.68
2002	5.07	1.48	3.59
2003	5.15	1.52	3.63
2004	5.39	1.64	3.75
2005	5.60	1.65	3.95
2006	4.95	1.26	3.69
2007	4.34	1.21	3.13
2008	4.07	1.12	2.95
2009	3.69	1.09	2.60
2010	3.48	1.11	2.37
2011	3.45	1.11	2.34
2012	3.64	1.17	2.47
2013	3.61	1.05	2.57
2014	3.61	1.05	2.57
2015	3.61	1.05	2.57

Figure G26 Time Pattern of Incentives and Taxes for Oregon

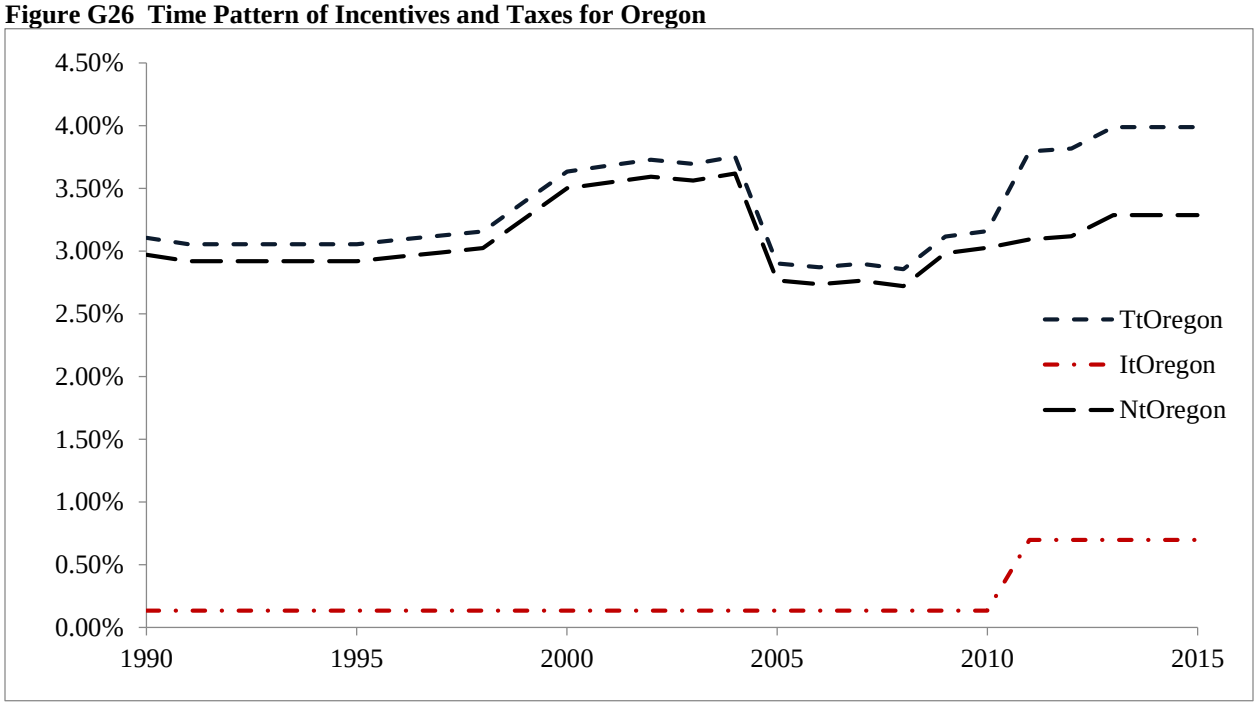

Table G26 Time Pattern of Incentives and Taxes for Oregon

Base year	TtOregon	ItOregon	NtOregon
1990	3.11	0.13	2.97
1991	3.05	0.13	2.92
1992	3.05	0.13	2.92
1993	3.05	0.13	2.92
1994	3.05	0.13	2.92
1995	3.05	0.13	2.92
1996	3.09	0.13	2.95
1997	3.12	0.13	2.99
1998	3.16	0.13	3.02
1999	3.40	0.13	3.26
2000	3.63	0.13	3.50
2001	3.68	0.13	3.55
2002	3.73	0.13	3.59
2003	3.70	0.13	3.56
2004	3.75	0.13	3.62
2005	2.90	0.13	2.77
2006	2.87	0.13	2.74
2007	2.90	0.13	2.76
2008	2.86	0.13	2.72
2009	3.12	0.13	2.98
2010	3.16	0.13	3.03
2011	3.79	0.70	3.09
2012	3.82	0.70	3.12
2013	3.99	0.70	3.29
2014	3.99	0.70	3.29
2015	3.99	0.70	3.29

Figure G27 Time Pattern of Incentives and Taxes for Pennsylvania

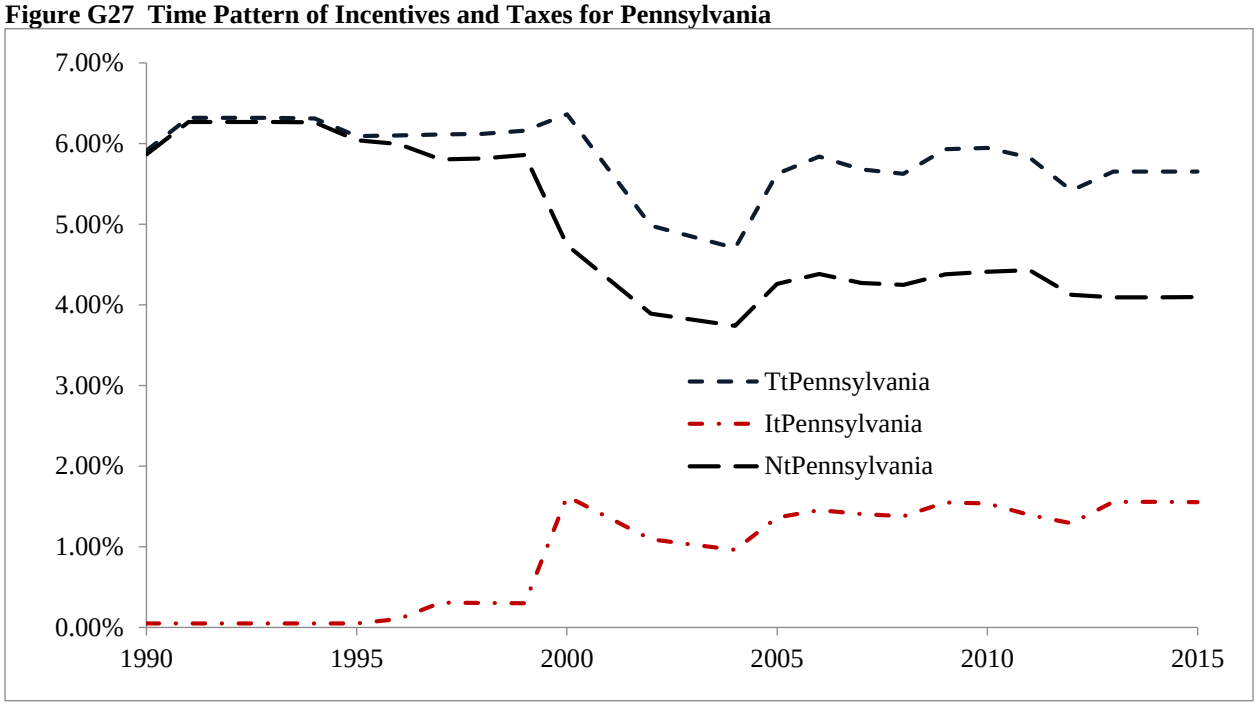

Table G27 Time Pattern of Incentives and Taxes for Pennsylvania

Base year	TtPennsylvania	ItPennsylvania	NtPennsylvania
1990	5.91	0.05	5.87
1991	6.32	0.05	6.27
1992	6.32	0.05	6.27
1993	6.32	0.05	6.27
1994	6.31	0.05	6.26
1995	6.09	0.05	6.04
1996	6.10	0.11	6.00
1997	6.11	0.31	5.80
1998	6.12	0.30	5.82
1999	6.16	0.30	5.86
2000	6.36	1.63	4.74
2001	5.67	1.36	4.32
2002	4.98	1.09	3.89
2003	4.84	1.03	3.81
2004	4.70	0.96	3.74
2005	5.62	1.36	4.26
2006	5.84	1.46	4.38
2007	5.68	1.41	4.27
2008	5.63	1.38	4.25
2009	5.93	1.55	4.38
2010	5.95	1.54	4.41
2011	5.83	1.40	4.43
2012	5.42	1.29	4.13
2013	5.65	1.56	4.09
2014	5.65	1.56	4.09
2015	5.65	1.55	4.10

Figure G28 Time Pattern of Incentives and Taxes for South Carolina

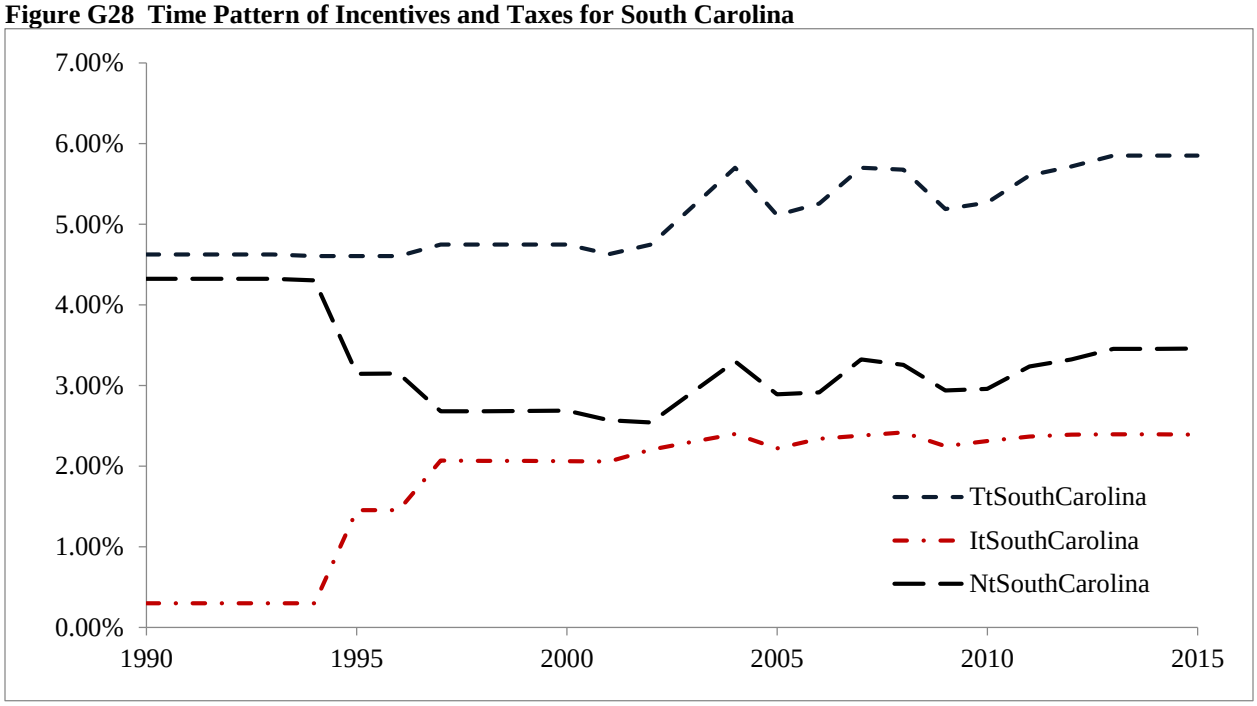

Table G28 Time Pattern of Incentives and Taxes for South Carolina

Base year	TtSouthCarolina	ItSouthCarolina	NtSouthCarolina
1990	4.63	0.30	4.32
1991	4.63	0.30	4.32
1992	4.63	0.30	4.32
1993	4.63	0.30	4.32
1994	4.60	0.30	4.30
1995	4.60	1.46	3.15
1996	4.60	1.45	3.15
1997	4.75	2.07	2.68
1998	4.75	2.07	2.68
1999	4.75	2.06	2.68
2000	4.75	2.06	2.69
2001	4.63	2.06	2.57
2002	4.75	2.21	2.54
2003	5.22	2.30	2.92
2004	5.70	2.40	3.30
2005	5.11	2.22	2.89
2006	5.26	2.34	2.91
2007	5.70	2.38	3.32
2008	5.67	2.42	3.26
2009	5.19	2.25	2.94
2010	5.27	2.31	2.96
2011	5.60	2.37	3.24
2012	5.72	2.39	3.32
2013	5.85	2.40	3.45
2014	5.85	2.39	3.46
2015	5.85	2.39	3.46

Figure G29 Time Pattern of Incentives and Taxes for Tennessee

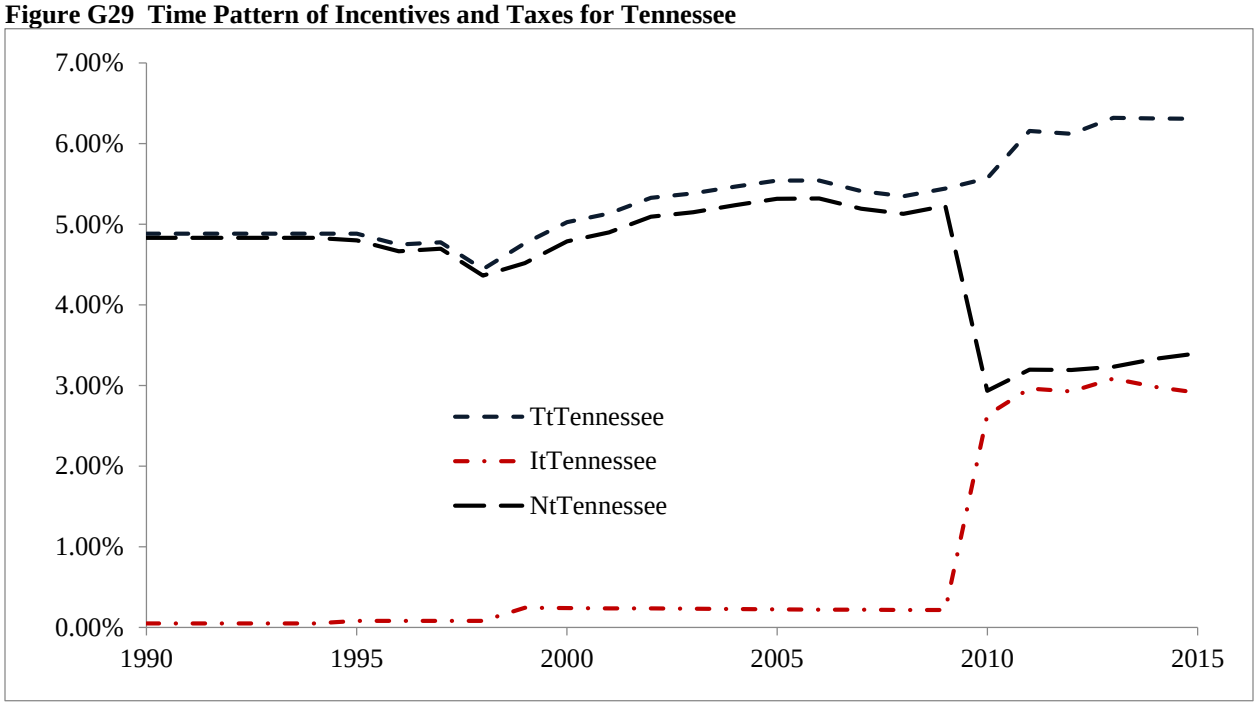

Table G29 Time Pattern of Incentives and Taxes for Tennessee

Base year	TtTennessee	ItTennessee	NtTennessee
1990	4.88	0.05	4.83
1991	4.88	0.05	4.83
1992	4.88	0.05	4.83
1993	4.88	0.05	4.83
1994	4.88	0.05	4.83
1995	4.88	0.08	4.80
1996	4.75	0.08	4.67
1997	4.78	0.08	4.70
1998	4.44	0.08	4.36
1999	4.76	0.24	4.52
2000	5.03	0.24	4.79
2001	5.13	0.24	4.90
2002	5.33	0.24	5.09
2003	5.38	0.23	5.15
2004	5.46	0.23	5.23
2005	5.54	0.23	5.32
2006	5.54	0.22	5.32
2007	5.41	0.22	5.19
2008	5.35	0.22	5.13
2009	5.44	0.22	5.23
2010	5.57	2.63	2.94
2011	6.16	2.96	3.20
2012	6.12	2.93	3.19
2013	6.32	3.09	3.23
2014	6.31	2.98	3.33
2015	6.31	2.91	3.40

Figure G30 Time Pattern of Incentives and Taxes for Texas

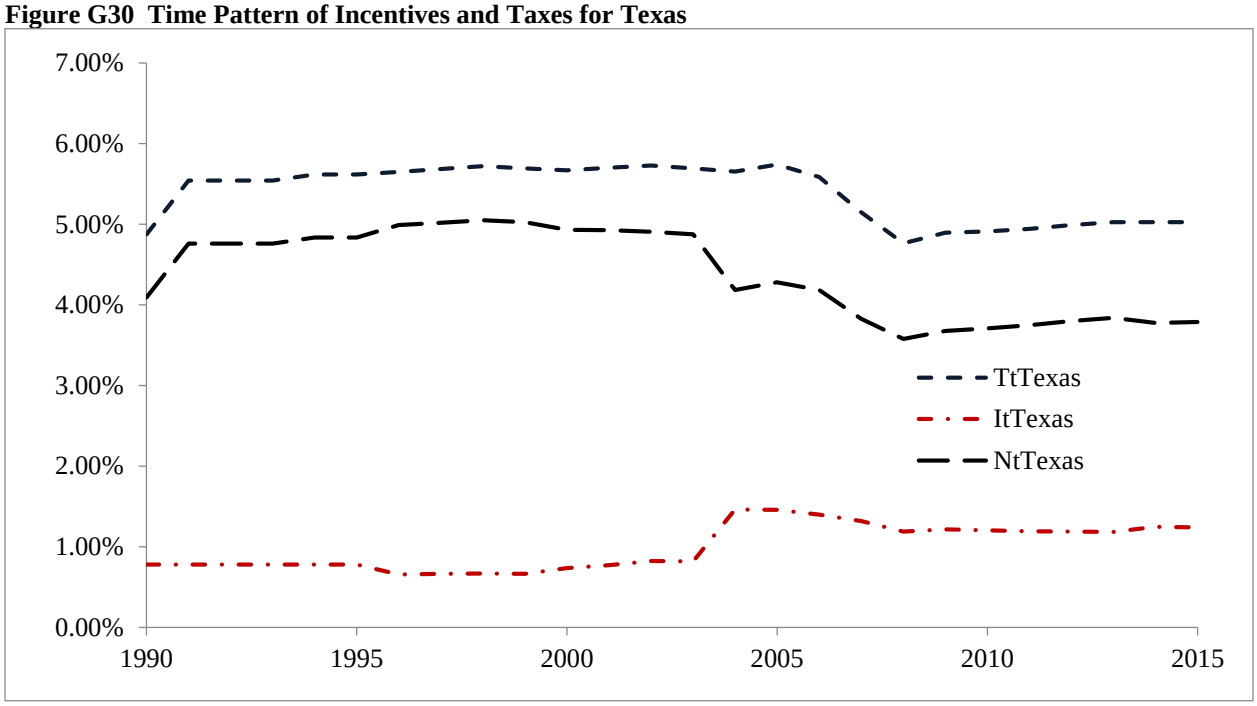

Table G30 Time Pattern of Incentives and Taxes for Texas

Base year	TtTexas	ItTexas	NtTexas
1990	4.88	0.78	4.09
1991	5.54	0.78	4.76
1992	5.54	0.78	4.76
1993	5.54	0.78	4.76
1994	5.62	0.78	4.83
1995	5.62	0.78	4.83
1996	5.65	0.66	4.99
1997	5.68	0.66	5.02
1998	5.72	0.67	5.05
1999	5.69	0.67	5.02
2000	5.67	0.74	4.93
2001	5.70	0.77	4.93
2002	5.73	0.82	4.91
2003	5.69	0.82	4.87
2004	5.65	1.46	4.19
2005	5.74	1.46	4.28
2006	5.59	1.40	4.19
2007	5.15	1.32	3.83
2008	4.76	1.19	3.58
2009	4.89	1.22	3.68
2010	4.91	1.20	3.71
2011	4.94	1.19	3.75
2012	4.99	1.19	3.80
2013	5.03	1.19	3.84
2014	5.03	1.25	3.78
2015	5.03	1.24	3.79

Figure G31 Time Pattern of Incentives and Taxes for Virginia

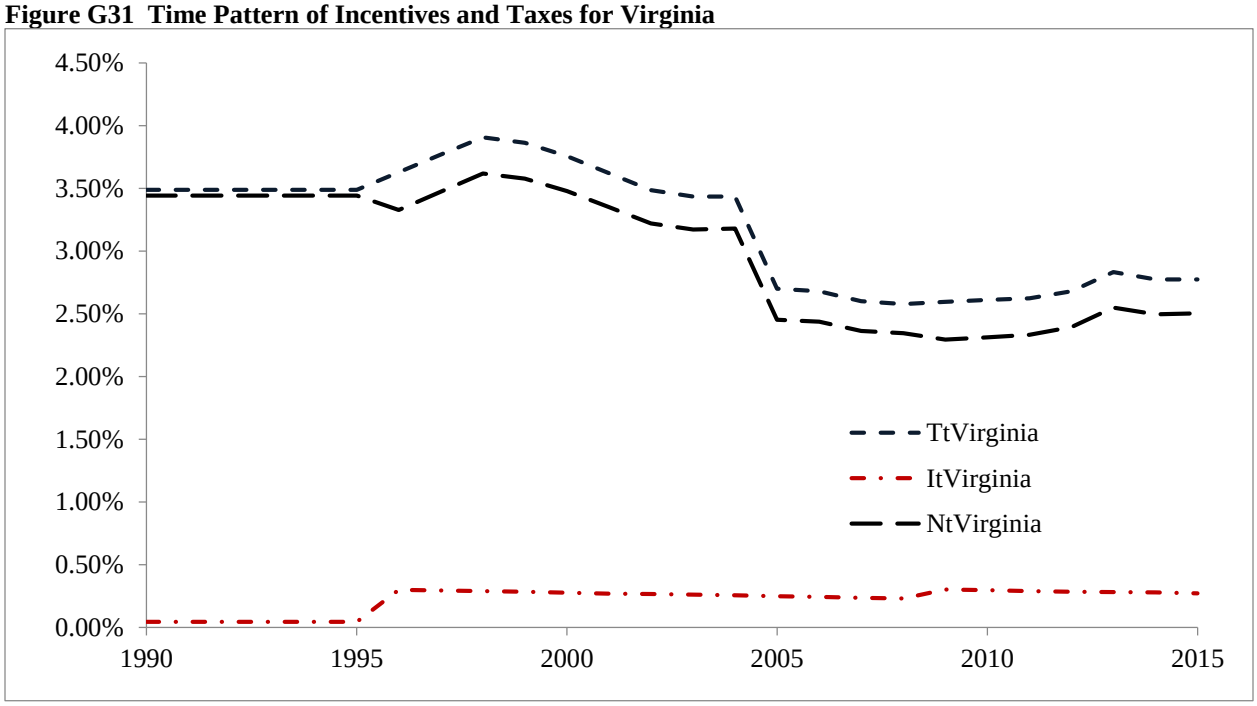

Table G31 Time Pattern of Incentives and Taxes for Virginia

Base year	TtVirginia	ItVirginia	NtVirginia
1990	3.49	0.04	3.44
1991	3.49	0.04	3.44
1992	3.49	0.04	3.44
1993	3.49	0.04	3.44
1994	3.49	0.04	3.44
1995	3.49	0.04	3.44
1996	3.63	0.30	3.33
1997	3.77	0.29	3.47
1998	3.91	0.29	3.62
1999	3.86	0.28	3.58
2000	3.76	0.28	3.48
2001	3.62	0.27	3.35
2002	3.49	0.27	3.22
2003	3.43	0.26	3.17
2004	3.43	0.26	3.18
2005	2.70	0.25	2.45
2006	2.68	0.24	2.44
2007	2.60	0.24	2.36
2008	2.58	0.23	2.35
2009	2.60	0.30	2.29
2010	2.61	0.30	2.31
2011	2.62	0.29	2.33
2012	2.68	0.29	2.39
2013	2.83	0.28	2.55
2014	2.77	0.28	2.50
2015	2.77	0.27	2.50

Figure G32 Time Pattern of Incentives and Taxes for Washington

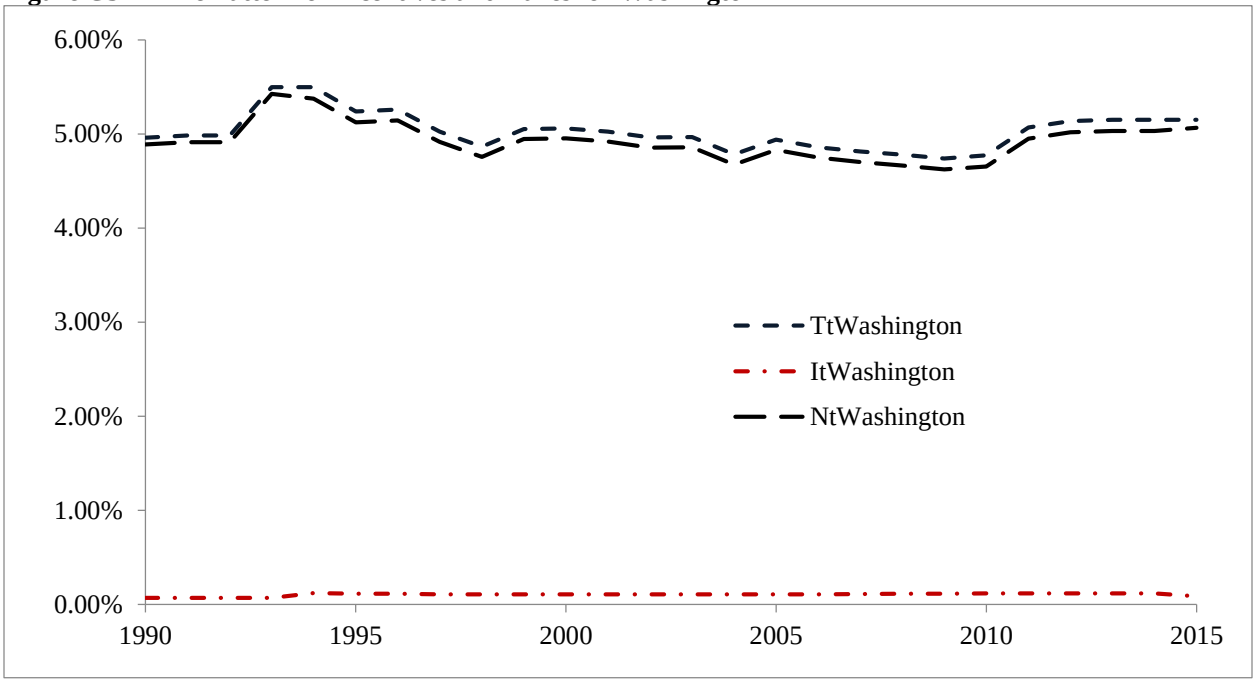

Table G32 Time Pattern of Incentives and Taxes for Washington

Base year	TtWashington	ItWashington	NtWashington
1990	4.96	0.07	4.89
1991	4.98	0.07	4.91
1992	4.98	0.07	4.91
1993	5.50	0.07	5.43
1994	5.50	0.12	5.37
1995	5.24	0.12	5.12
1996	5.26	0.12	5.15
1997	5.02	0.11	4.92
1998	4.87	0.11	4.76
1999	5.05	0.11	4.95
2000	5.06	0.11	4.95
2001	5.03	0.11	4.92
2002	4.96	0.11	4.86
2003	4.97	0.11	4.86
2004	4.78	0.11	4.68
2005	4.94	0.11	4.83
2006	4.86	0.11	4.75
2007	4.81	0.11	4.70
2008	4.78	0.11	4.67
2009	4.74	0.12	4.62
2010	4.77	0.12	4.65
2011	5.07	0.12	4.95
2012	5.14	0.12	5.02
2013	5.15	0.12	5.03
2014	5.15	0.12	5.03
2015	5.15	0.09	5.06

Figure G33 Time Pattern of Incentives and Taxes for Wisconsin

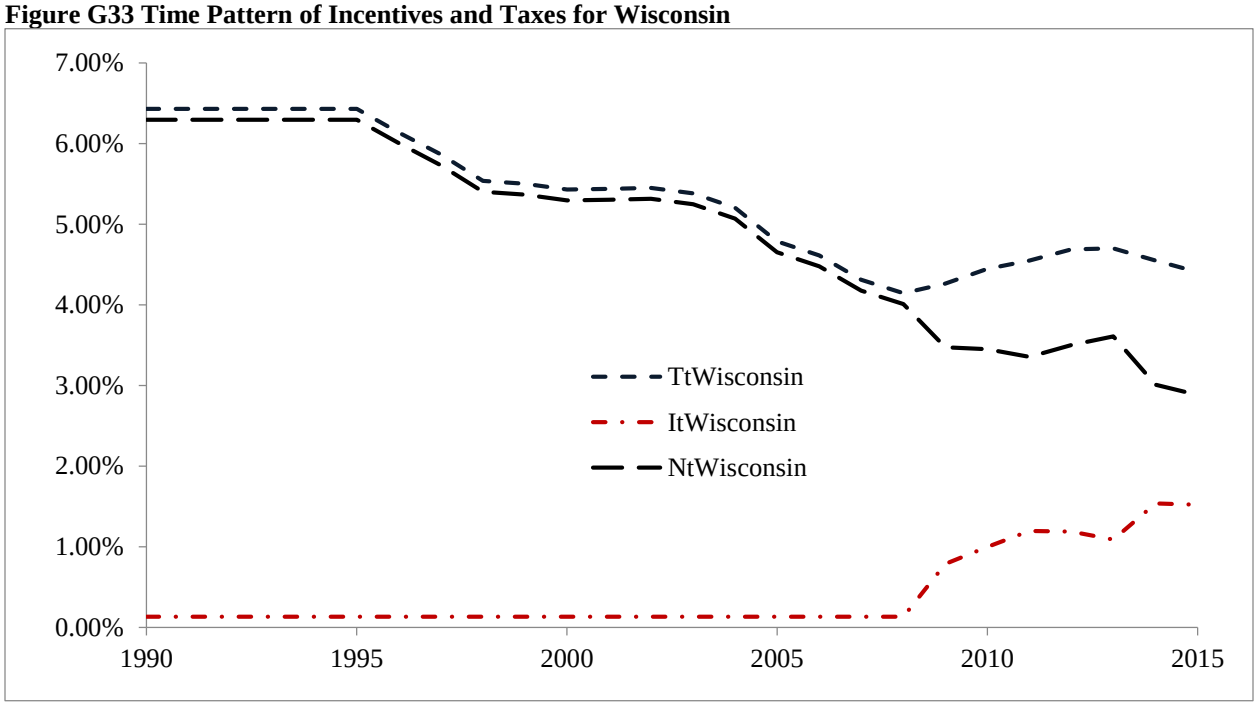

Table G33 Time Pattern of Incentives and Taxes for Wisconsin

Base year	TtWisconsin	ItWisconsin	NtWisconsin
1990	6.43	0.13	6.29
1991	6.43	0.13	6.29
1992	6.43	0.13	6.29
1993	6.43	0.13	6.29
1994	6.43	0.13	6.29
1995	6.43	0.13	6.29
1996	6.14	0.13	6.00
1997	5.86	0.13	5.73
1998	5.54	0.13	5.40
1999	5.50	0.13	5.37
2000	5.43	0.13	5.30
2001	5.44	0.13	5.30
2002	5.45	0.13	5.31
2003	5.38	0.13	5.25
2004	5.20	0.13	5.07
2005	4.79	0.13	4.65
2006	4.61	0.13	4.48
2007	4.31	0.13	4.18
2008	4.14	0.13	4.01
2009	4.26	0.79	3.47
2010	4.45	1.00	3.45
2011	4.55	1.20	3.35
2012	4.69	1.19	3.50
2013	4.70	1.09	3.61
2014	4.55	1.54	3.01
2015	4.41	1.52	2.88

APPENDIX H: EFFECTS OF ELIMINATING DIFFERENT INCENTIVE TYPES BY STATE, WITH COMPARISONS TO COSTS OF DIFFERENT INCENTIVE TYPES BY STATE

Table H1 considers the increase in net taxes to value-added ratio, averaged across the 31 export-base industries, of eliminating different incentive types, by state, for a facility start year of 2015. This is compared with the nominal cost of the incentive, as a ratio to value-added, for each incentive type and state.

As with the overall national numbers, for each state and incentive type, in general the increase in net taxes due to eliminating an incentive is not far below 100 percent of the actual cost of the incentive. In theory, because of limits on incentives, eliminating one incentive could lead to increases in other incentives, as this allows more of other incentives to be taken against the corporate income tax. But in the real world, it appears that usually these incentive interactions are of minor importance.

A few exceptions do occur. In Illinois, eliminating the ITC increases net taxes by about half of the nominal cost of the ITC. This occurs because the Illinois JCTC is very generous with a limited carry-forward. Eliminating the ITC allows more of the JCTC to be claimed.

In addition, in Arizona, eliminating the ITC actually reduces net taxes. This occurs because the Arizona incentive structure says that the firm can take only the lesser of either the ITC or the JCTC. Eliminating the ITC, on average, is assumed to allow firms to take the higher JCTC.

Table H1 Effects on Net Taxes/Value-Added Ratio by State of Eliminating Various Incentives, Compared with Incentive Nominal Cost

PANEL A: EFFECT OF ELIMINATING INCENTIVES

State	Baseline net taxes/value-added	Eliminating: Property tax abatements	Customized job training	Investment tax credit	Job creation tax credit	R&D tax credit
National	3.31	0.38	0.06	0.19	0.63	0.13
Alabama	2.69	0.61	0.05	1.14	0.00	0.00
Arizona	4.15	0.00	0.16	-0.08	0.11	0.29
California	3.91	0.00	0.08	0.00	0.00	0.39
Colorado	3.67	0.00	0.07	0.00	0.62	0.00
Connecticut	5.25	0.34	0.00	0.16	0.00	0.10
District of Columbia	4.03	1.52	0.00	0.00	0.00	0.00
Florida	3.45	0.22	0.07	0.74	0.16	0.02
Georgia	3.52	0.00	0.02	0.00	0.41	0.09
Illinois	4.11	0.28	0.01	0.06	0.85	0.02
Indiana	1.86	0.63	0.02	0.55	1.19	0.17
Iowa	3.49	1.15	0.36	0.76	0.07	0.17
Kentucky	1.17	0.08	0.02	2.24	0.00	0.00
Louisiana	1.92	0.77	0.16	0.05	2.10	0.21
Maryland	4.60	0.00	0.00	0.00	0.09	0.27
Massachusetts	4.12	0.00	0.07	0.18	0.00	0.25
Michigan	3.49	1.27	0.21	0.00	0.52	0.00
Minnesota	4.90	0.00	0.03	0.31	0.73	0.07
Missouri	4.04	0.00	0.31	0.00	0.47	0.00
Nebraska	2.26	0.00	0.17	0.87	1.29	0.08
Nevada	2.56	0.19	0.04	0.00	0.00	0.00
New Jersey	1.49	0.00	0.02	0.10	2.44	0.27
New Mexico	4.23	1.60	0.45	0.15	1.64	0.25
New York	1.12	0.61	0.00	0.44	2.40	0.05
North Carolina	2.68	0.00	0.01	0.00	0.84	0.07
Ohio	2.57	0.49	0.00	0.00	0.54	0.02
Oregon	3.29	0.00	0.00	0.00	0.56	0.13
Pennsylvania	4.10	1.25	0.01	0.00	0.12	0.08
South Carolina	3.46	0.98	0.11	0.92	0.19	0.12
Tennessee	3.40	2.46	0.05	0.03	0.24	0.00
Texas	3.79	0.58	0.08	0.00	0.51	0.07
Virginia	2.50	0.00	0.04	0.00	0.23	0.00
Washington	5.06	0.02	0.07	0.02	0.00	0.00
Wisconsin	2.88	0.00	0.17	0.58	0.64	0.12

Table H1 (Continued)

PANEL B: COST OF DIFFERENT INCENTIVES

State	Nominal cost of : Property tax abatements	Customized job training	Investment tax credit	Job creation tax credit	R&D tax credit
National	0.39	0.07	0.20	0.64	0.13
Alabama	0.61	0.05	1.14	0.00	0.00
Arizona	0.00	0.16	0.21	0.39	0.29
California	0.00	0.08	0.00	0.00	0.39
Colorado	0.00	0.07	0.00	0.62	0.00
Connecticut	0.36	0.00	0.20	0.00	0.10
District of Columbia	1.67	0.00	0.00	0.00	0.00
Florida	0.22	0.07	0.76	0.17	0.02
Georgia	0.00	0.02	0.00	0.41	0.09
Illinois	0.29	0.01	0.12	0.91	0.02
Indiana	0.63	0.02	0.66	1.19	0.17
Iowa	1.19	0.38	0.80	0.07	0.17
Kentucky	0.08	0.03	2.24	0.00	0.00
Louisiana	0.81	0.17	0.05	2.10	0.21
Maryland	0.00	0.00	0.00	0.10	0.27
Massachusetts	0.00	0.08	0.20	0.00	0.25
Michigan	1.33	0.22	0.00	0.52	0.00
Minnesota	0.00	0.04	0.31	0.73	0.07
Missouri	0.00	0.32	0.00	0.47	0.00
Nebraska	0.00	0.18	0.99	1.29	0.08
Nevada	0.19	0.04	0.00	0.00	0.00
New Jersey	0.00	0.02	0.10	2.44	0.27
New Mexico	1.70	0.48	0.16	1.64	0.25
New York	0.63	0.00	0.44	2.40	0.05
North Carolina	0.00	0.01	0.00	0.84	0.07
Ohio	0.49	0.00	0.00	0.54	0.02
Oregon	0.00	0.00	0.00	0.56	0.13
Pennsylvania	1.34	0.01	0.00	0.12	0.08
South Carolina	1.00	0.11	0.94	0.22	0.12
Tennessee	2.59	0.05	0.03	0.24	0.00
Texas	0.58	0.08	0.00	0.51	0.07
Virginia	0.00	0.04	0.00	0.23	0.00
Washington	0.00	0.07	0.02	0.00	0.00
Wisconsin	0.00	0.18	0.00	0.64	0.12

Table H1 (Continued)

PANEL C: RATIO OF EFFECT OF ELIMINATING INCENTIVE TO ITS NOMINAL COST

	Ratio of effect of eliminating incentive to its nominal cost:				
State	Property tax abatements	Customized job training	Investment tax credit	Job creation tax credit	R&D tax credit
National	96.6	96.2	93.1	98.6	100.0
Alabama	100.0	100.0	100.0		
Arizona		97.7	-39.8	27.1	100.0
California		93.3			100.0
Colorado		99.4		100.0	
Connecticut	95.2		82.5		100.0
District of Columbia	91.0				
Florida	98.9	98.8	98.0	95.3	100.0
Georgia		97.6		99.5	100.0
Illinois	96.1	97.5	52.6	93.3	100.0
Indiana	99.0	98.4	83.4	100.0	100.0
Iowa	96.5	95.4	94.9	100.0	100.0
Kentucky	100.0	99.9	100.0		
Louisiana	95.0	94.4	100.0	100.0	100.0
Maryland				96.4	100.0
Massachusetts		94.7	88.9		100.0
Michigan	95.7	95.7		100.0	
Minnesota		93.0	100.0	100.0	100.0
Missouri		95.3		100.0	
Nebraska		97.4	87.9	100.0	100.0
Nevada	100.0	100.0			
New Jersey		94.1	96.5	100.0	100.0
New Mexico	93.9	93.9	98.1	100.0	100.0
New York	96.6		100.0	100.0	100.0
North Carolina		95.7		100.0	100.0
Ohio	100.0			100.0	100.0
Oregon				100.0	100.0
Pennsylvania	92.9	92.9		100.0	100.0
South Carolina	98.1	97.5	98.0	83.7	100.0
Tennessee	94.9	95.8	100.0	100.0	
Texas	100.0	100.0		100.0	100.0
Virginia		95.2		100.0	
Washington		100.0	100.0		
Wisconsin		95.7		100.0	100.0

NOTE: Table shows, for each incentive and state, three different calculations. The first is the increase in the present value of net taxes to the present value of value-added, averaged across 31 export-base industries, for a facility start year of 2015. The second is the actual cost of the incentive, measured as the present value of what is paid out divided by the present value of value-added, averaged across 31 export-base industries. Panel C is the ratio of the number in Panel A to the corresponding number in Panel B, expressed in percentage terms.

SOURCE: Author's calculations

APPENDIX I: A NOTE ON CROSS-CHECKING RESULTS

One concern about this database's model is verifying that it is implemented properly. These tax and incentive rules are complex. How can we verify that this database's simulations of the taxes and incentives of a hypothetical firm are accurate?

To help verify the simulations, some of the calculations were done in two completely different ways, by different researchers. The reported simulations in this paper were implemented using a program in Stata. But some key simulations were cross-checked with the same simulation done using Excel, by a different researcher.

Specifically, for one city in each state, and for three industries, Excel simulations were done for two years: 1990 and 2015. The industries chosen were motor vehicles, chemicals, and software: three export-base industries, two in manufacturing and one in nonmanufacturing, including one very research-intensive industry (chemicals). The Excel simulations were compared with the Stata simulations. In most cases they matched exactly. In cases where they did not match, the Stata code logic and Excel calculations were examined until the reasons for any discrepancies were uncovered. Typically, these discrepancies were due either to some error in the Stata or Excel code or to different interpretations of some subtle feature of the tax or incentive rules. The discrepancies were then resolved by correcting the code and agreeing upon a common interpretation of the tax and incentive rules. In addition, for a few other cities and states and years with unusual incentive rules, the same procedure was followed, of calculating the taxes and incentives using both Stata and Excel, and making sure that the two different methods yielded the same results.

In addition, the time series for incentives in each state, reported in Appendix G, were examined. Any large, abrupt jump in incentives or taxes, particularly if it was quickly reversed, was examined to make sure that the source of the jump was understood and represented a valid change in tax or incentive policy.

While it is impossible to eliminate all human error, these procedures minimize the likely incidence and size of errors in these database simulations.