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TAX EXPORTING, FEDERAL DEDUCTIBILITY, AND STATE TAX STRUCTURE

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ABSTRACT

This paper studies the interaction between the federal and state tax systems during the 1980s and in particular considers how the Tax Reform Act of 1986 affected state tax structure. Using a panel data set on state governments over a nine year period, I estimate tax share equations for six categories of taxes.

I find that the state personal income tax is sensitive to changes in its tax price but find a much smaller sensitivity to changes in tax prices for the general sales tax. I then consider various reasons for why the sales tax does not exhibit a sensitivity to changes in tax price and consider the implications of these results for policy makers.

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I. Introduction

A by-product of the debate leading up to the Tax Reform Act of 1986 (TRA86) was a sharpened focus on the interrelationship between taxation at the federal level and at the state and local level. The particular issue sharpening the focus was the proposed elimination of federal deductibility for all state and local taxes. Governors expressed grave concern over the possibility that ending federal deductibility would create pressure on state officials to lower taxes. One could hear regular forecasts of dire consequences for state and municipal programs as taxes would have to be lowered. After considerable political maneuvering, the deduction was eliminated only for general sales taxes when the 1986 tax law was finally enacted. Economists and many state officials predicted a decreased reliance on the general sales tax as a result.

To the surprise of many analysts, it appears that states have not reduced their reliance on the sales tax; the tax continues to be an important source of revenue for states and in many states is actually increasing in importance. Why were the predictions so far from the mark? Were the economists and their models wrong? Or have state legislators and governors responded incorrectly to the new economic environment resulting from TRA86?

On a broader level, how do state governments alter state tax policy when federal tax policy changes? How should these governments respond? In this paper, I review economic models of state tax structure which incorporate the exporting of state taxes both to the federal government through federal deductibility and to non-residents through non-resident consumption, labor supply, and business activity in the state. Economic models of state tax structure can be helpful on two levels. First, they can provide predictions for how state tax policy will change in response to changes in federal tax policy. These predictions may be helpful to state policy makers as they

adjust their tax structure to maintain balanced budgets in response to changes in federal tax policy. The predictions may also be useful to federal policy makers. Changes in federal tax policy clearly have effects on state and local governments; empirical work such as is presented in this paper helps to quantify the magnitudes of these effects. In effect, empirical results may provide a benchmark estimate of how large a response in tax structure may be expected as a result of changes in the economic environment facing the state. Second, models can provide guidelines for how state policy makers would respond to changes in federal tax policy if they maximized the welfare of residents of their states. The guidelines suggest how state officials should take into account the degree of exporting of state taxes, the distribution of income within a state and other factors as they attempt to construct an optimal mix of taxes for their own state.

After reviewing models, I then analyze data on state tax structure for fiscal years 1980 through 1988 to answer some of the questions posed above. Specifically, I investigate how state tax structures respond to changes in federal tax policy and other economic variables. I then consider the response of the sales tax in more detail. Is the sales tax different from other taxes? Can we extrapolate from the experience of ending deductibility for this tax to what we would expect if deductibility were eliminated for all taxes? This last question is of particular importance as the federal government looks for ways to reduce the federal deficit during a period when many states are experiencing severe fiscal distress.

II. Background

Economists have long recognized that the ability to export taxes to out of state taxpayers should affect the choice of tax instruments. For example, Timothy Hogan and Robert Shelton (1973) present a model where a local government attempts to maximize tax collections from out of state taxpayers.

Similarly, Richard Arnott and Ronald Grieson (1981) present a model of optimal tax policy when interstate tax exporting is possible. Neither of these papers considers the opportunities for exporting taxes to the federal government through federal tax deductibility[1]. With the proposals in Treasury I and II to eliminate the federal deduction for state and local tax payments, economists shifted their attention to measuring how altering deductibility would affect state and local government spending and choice of tax instruments[2].

Based on the research described above, most economists predicted a decreasing reliance on the general sales tax after TRA86 as this was the only tax for which deductibility was removed. In Metcalf (1990), I discuss the predictions by economists and note that there does not appear to be any perceptible movement away from the use of sales taxation. Paul Courant and Edward Gramlich (1990) also note this in a review of the impact of TRA86 on state and local fiscal behavior.

There are two competing theories for why the sales tax share did not fall as expected. The first theory follows from the average tax price literature of the 1980s and will be termed the "incomplete deductibility" theory.[3] The second theory follows from a theory of tax distribution and political interest groups. In the next section, I describe those two models in some detail.

Before turning to a closer consideration of the two models, it may be useful to consider how the collection of revenues at the state level has changed over the past decade. Figures 1 and 2 show the relative importance of the five major tax instruments that are used by state governments for the years 1978 through 1988.[4] The graphs show that personal income taxes and general sales taxes became more important as sources of revenue over this period. This reflects a longer term trend in which these sources of revenue became more important as selective sales and corporate income tax collections

declined in importance. In addition, Figure 1 illustrates the importance of the Tax Reform Act of 1986 on personal income tax collections in fiscal year 1987. There is a one time increase of over 1% of personal income tax collections due to the windfall effect with a corresponding .4% drop in general sales tax collections as a fraction of the total. In constructing a theory of how TRA86 affected state tax structure, it is important to keep in mind the trend toward greater use of personal income and general sales taxes during the 1980s. That general sales tax collections increased as a fraction of taxes and current charges after Tax Reform may perhaps be explained quite simply by the explanation that they would have grown even faster in the absence of reform.

III. A Model of the Choice of State Tax Rates

In this section, I describe a basic tax price model of the choice of state tax rates which takes into account exporting both to the federal government through deductibility and to non-residents who either work or make purchases within the state.[5] The model posits a state government maximizing the utility of a representative individual (resident). There is also consumption and labor supply by non-resident individuals about whom the state is not concerned (except for their tax revenue potential). Individuals take prices as given and maximize utility over labor supply, a taxable commodity and a non-taxable commodity. The government maximizes the indirect utility function of the resident subject to a government budget constraint that expenditures not exceed taxes collected from residents and non-residents. Choice variables for the government are the two tax rates, one on wage income and the other a sales tax rate on the taxable commodity.

A key concept in this model is that of a "tax price". An example will illustrate the concept. Consider a taxpayer in a 50% federal tax bracket living in a state with a state income tax. Let us assume that she pays $1000

in state personal income taxes. She can then take this $1000 in state taxes as a deduction on her federal return. The $1000 deduction reduces her federal tax liability by $500 (.50 x $1000). Thus her net state tax liability after taking federal deductibility into account is only $500. Put differently, the price of a dollar of state taxes is one minus her federal marginal tax rate and in this example equals .50.[6]

The model provides the not surprising result that increasing the federal tax price for the state sales (income) tax induces the state to decrease (increase) its sales tax rate and increase (decrease) its income tax rate. The result is not surprising assuming that state policy makers are attempting to maximize the welfare of residents. Whether policy makers maximize resident welfare or not, comments by many state lawmakers and governors during the debate leading up to TRA86 suggested that they well understood the sensitivity of tax structure to changes in tax prices. This inverse relationship between tax price and tax share provides the formal motivation for the tax price literature of the mid 1980s in which researchers estimated demand equations for state and local tax shares as functions of the tax price of these state and local level taxes.

Next, I consider the effects of the Tax Reform Act of 1986 on the choice of tax rates. There were two major changes in TRA86 which affected tax prices for state and local taxes: first, marginal tax rates were lowered for most tax payers. This rate reduction had the effect of reducing the value of federal deductions, including deductions for state and local taxes.

Above, I considered an example of a taxpayer in a 50% federal tax bracket. Now consider a tax reform which reduces her federal marginal tax rate to 28%. She still pays $1000 in state income taxes and still takes a $1000 deduction on her federal return. But now the reduction in her federal tax liability is only $280 (.28 x $1000) and her net state tax liability is

now $720. Her tax price for state income taxes has increased from .50 to .72.

Lower marginal tax rates reduce the value of all deductions; in our example, the tax price of a dollar of state taxes has been increased. But TRA86 also eliminated the deduction for the sales tax (thereby increasing its tax price to 1: A dollar of sales tax now costs the taxpayer a full dollar). However, for most taxpayers, the general sales tax deduction is generated from tables based on data from the Consumer Expenditure Survey (Feenberg and Rosen (1986) describe the IRS methodology in more detail). While there is no hard evidence on this matter, there is widespread belief among tax experts that the tables significantly underestimate the general sales tax liability actually incurred by individuals[7].

If there is incomplete deductibility of sales taxes prior to 1986, then it is no longer clear that the sales tax rate will fall after 1986. The intuition is straightforward. Take a polar case where the sales tax tables essentially give no deduction for state sales taxes. Then the federal tax price for state sales taxes equals one prior to and after Tax Reform and the only price change is an increase in the tax price for income taxes as federal marginal tax rates fall.[8]

The interaction between exporting to the federal government through deductibility and to non-residents is slightly more complicated. Analyzing the two polar exporting cases provides the clearest insight. If there is no exporting of taxes at all (either of the sales tax or the personal income tax) then the sales tax rate can increase or decrease depending on the degree of incomplete deductibility. However, in the case of complete exporting of the sales tax and no exporting of the income tax, then the sales tax rate is unambiguously reduced after TRA86. This is perhaps surprising as one might have imagined that the increase in the income tax price would have induced a shifting away from the income tax and toward the sales tax. The intuition for

the result is quite straightforward however. In the case of complete exporting, the state acts as a monopolist in setting its sales tax rate to maximize tax revenue from non-residents. An increase in the gross price of the taxable commodity to non-residents requires an offsetting decrease in the sales tax rate to maintain the gross price at its revenue maximizing level. The degree to which the income tax rate falls relative to the sales tax rate depends on several factors. In particular, it falls by a greater amount the larger the sales tax base is relative to the income tax base and the larger labor supply elasticities are relative to demand elasticities.

Summarizing, it is quite possible that sales tax rates might increase after TRA86. In addition, states with a high degree of sales tax exporting may be less likely to increase the sales tax rate. This runs counter to the intuition of many economists who would have expected exporting to act as a "safety valve" for states. However, this model suggests that states must take care not to jeopardize their non-resident revenues.

The virtue of the model sketched out above is that it integrates for the first time the two types of exporting of state and local taxes. Many of the results are not surprising upon a bit of reflection, particularly that incomplete deductibility of sales taxes at the federal level might in fact have reduced substantially the degree to which the price for general sales taxes increased after TRA86. However the complicated interaction between the two types of exporting has not been well understood nor has it been adequately treated in the literature.

The model described above is an "average" tax price model as it models state tax structure policy as a function of one particular tax price, the average tax price of all residents in the state. It is a variant on "decisive" voter models of tax policy which identify a particular resident (median, typically). An alternative model recognizes that state tax policies

reflect a balancing of interests among different income groups. Robert Inman (1989) provides an explanation of the increase in the reliance on sales taxes since TRA86 based on such a model. The elimination of federal deductibility of any tax increases the tax burden on wealthier taxpayers more since this group is more likely to itemize deductions on their federal return. Assuming that state tax structure was constructed to achieve a distributional balance among different income groups prior to TRA86, states will wish to shift taxes from wealthier tax payers to lower income tax payers after TRA86. Assuming that sales taxes fall more heavily on the poor and income taxes more heavily on the rich, increasing the share of taxes coming from sales taxes and decreasing the share from income taxes will help regain the distributional balance upset by TRA86.[9] In the empirical work that follows, I will try and shed some light on which of these competing theories best explains the continued importance of state sales taxes.

IV. Measuring Tax Prices for State and Local Taxes

As noted above, if taxpayers itemize their deductions on their federal income tax and take state (and local) taxes as a deduction, the net cost of a dollar of the state tax is reduced from 1 to $1-\tau$, where τ is the federal marginal tax rate on income for the taxpayer. Measuring the appropriate tax rate is not straightforward however. For example, additional state tax deductions could reduce taxable income sufficiently that the taxpayer is pushed into a lower tax bracket. In this case, the marginal tax rate is not the rate that she faced prior to an increase in state tax liability. Alternatively, a taxpayer may not have sufficient deductions to make it worth her while to itemize on her return. In this case her tax price would appear to be one. However, the additional state taxes might be sufficient to make itemizing worthwhile in which case the tax price is less than one. These two examples illustrate the important sources of feedback from tax collections to

determination of the tax prices. In the presence of this feedback, ordinary least squares estimates of tax price coefficients in tax share regressions will be biased. I will use an instrumental variable approach to control for this simultaneity. These examples also highlight the advantages of using the NBER TAXSIM tax calculator to compute individual tax prices. TAXSIM is a set of Fortran routines which uses detailed data from the IRS Individual Tax Model[10] to compute the federal tax liability for individual tax returns. TAXSIM can be programmed to compute marginal tax rates by computing the additional tax liability on an individual's tax return resulting from an additional dollar of income. For the purposes of this study, I impute to each return an additional dollar of state tax deductions (for any given tax) and measure the reduction in federal and state tax liability. The tax price (P_i) equals one minus the reduction in tax liability. The resulting tax price measure for returns within a state can be averaged to estimate a state wide average marginal tax price for particular taxes.

There are three additional significant advantages to using TAXSIM to measure tax prices. First, state tax codes are programmed into TAXSIM along with the federal tax code. While the discussion in section III assumed that only state taxes were deducted from federal taxes, in actuality, 12 states allow a deduction for federal taxes on the income tax[11]. If federal income taxes can be deducted at the state level, then the taxprice for an itemizer becomes

$$(1) \qquad P' = 1 - \frac{\tau_F(1-\tau_s) + \tau_s(1-\tau_F)}{1-\tau_F\tau_s} = 1-\tau^*$$

where τ_F is the appropriate federal marginal tax rate and τ_s the appropriate state tax rate. Again, TAXSIM would simply look at the change in the overall tax liability (τ^*) to determine the tax price.

A second advantage of using TAXSIM is that I can construct different tax prices for different state taxes. Tax prices may differ because of either

changes in federal deductibility rules (e.g. the loss of deductibility for the general sales tax in 1986) or differences in state deductibility. With respect to the latter, some states allow deductibility of state income taxes but not state general sales taxes and vice versa.[12]

A final advantage of the TAXSIM program is that I can construct tax prices for different taxpayers in the income distribution for each state. One of the recurring controversies in the tax price literature is over whose tax price matters. Is it the Median Voter? The Mean Voter? The Rich Voter? One problem with the median voter approach is that the taxpayer with median income doesn't typically itemize at the federal level. In this case, altering the deductibility rules should have no impact on state tax structure. Feldstein and Metcalf (1987) argued that the mean voter is more appropriate due to possibilities of log rolling and coalition formation. I have used TAXSIM to construct a panel of tax prices for the various states for different points along the income distribution. In the regression work, I use tax price measures for different taxpayers in various income groups to determine whose tax price matters in the final analysis.[13]

V. An Empirical Analysis at the State Level

In this section I consider three questions: 1) How are tax shares affected by changes in tax prices? 2) Do changes in tax prices affect sales tax rates and the sales tax base differently? 3) Whose tax price matters?

Table 1 gives summary information on the data used in the analysis. The first six rows in table 1 show information on different taxes as fractions of personal income across the 48 continental states from fiscal years 1980 through 1988.[14] As noted above, personal income taxes and general sales tax revenue are the two biggest tax revenue sources, followed by charges and licenses and selective sales tax revenue. The next two variables are tax prices for state personal income taxes and general sales taxes. These were

constructed from TAXSIM as described above and are net of federal and state taxes. Across the sample, the correlation between these two tax prices is 0.57.[15] The mean price for both is slightly more than 91, meaning that a $100 increase in state sales tax collections has a cost net of taxes to taxpayers on average of $91.

In addition to the tax price variables, I include other demographic variables in the regressions. As a measure of the degree of exporting of state general sales taxes, I use the Sales Activity Index as computed by Sales and Marketing Management Magazine. This index measures the fraction of sales within a state relative to the aggregate sales nationally and scales this fraction by the fraction of national population within a state. Hence a high measure of the index indicates a high degree of spending within the state relative to the population of the state. I use this variable to measure non-resident consumption within the state.[16] In addition to these variables I include an indicator variable equaling one if the state collects taxes from a severance tax, age demographic variables (fraction of population between ages 18 and 44 and fraction aged 65 and over), and changes in the unemployment rate. The severance tax variable measures the degree to which the state can rely on severance tax collections. To the extent that residents perceive that severance taxes are exported to non-residents, this should lead to a reduced reliance on other taxes. Residents between ages 18 and 44 and older than 65 are likely to have a high consumption to income ratio and should prefer lower reliance on sales taxation. Shocks to the state's economy (as measured by changes in the unemployment rate) will result in a fall in tax collections whether collections fall faster or slower than income is not clear a priori. I add a trend variable and fixed effects in the share regressions and dummies for census regions in the rate and base regressions to control for macroeconomic effects and regional specific differences in reliance on sales

taxes.[17]

Table 2 reports regression results for six categories of taxes as a fraction of personal income. The first two regressions accord with theory with respect to the tax prices. In the personal income regression, the income tax price effect is negative and strongly significant while the sales tax effect is positive and significant. In the general sales tax regression, the sales tax price effect is negative; however the income tax price effect is also negative. Note though that neither estimate is statistically significant. Moreover, the price effect in the sales tax regression is economically insignificant. Eliminating the federal deduction for either the state personal income or general sales tax would increase either tax price by roughly 8 percentage points (from 92 to 100). An eight point increase in the sales tax price would imply a drop in sales tax collections of .6%. An eight point increase in the income tax price, on the other hand, would imply a drop in personal income tax collections of 34%. This very different response merits further consideration; one possible explanation is that the use of the sales tax tables by most itemizers blunts the marginal effect to a great extent.

The average export effect for five out of six regressions is positive (the exception being selective sales taxes); moreover it is statistically significant in three of the six regressions. The age group between 18 and 44 in general would like to see less taxes collected (except for the other category) with the point estimate highest for the two most visible taxes - personal income and general sales. The elderly on the other hand prefer general and selective sales taxes along with charges and licenses, and corporate taxes to personal income and other taxes. These results don't accord with priors; I would have expected both these groups to prefer income to sales taxes. Increases in unemployment lead to a fall in tax collections

relative to income in all categories suggesting that the tax revenues fall more sharply than does income.

Overall, these regressions suggest that own price effects are important for the income tax but not for the sales tax. This conclusion is supported by the price effects on other taxes. One would think that increases in income or sales tax prices would lead to an increased reliance on some of the other taxes. This effect is found for the income tax price in 3 of the 5 taxes (with positive estimates statistically significant in two cases). However the sales tax effect on other taxes is very small, more often negative than positive and only significant in one regression (a case where the effect is negative).

Why is there such a small and often insignificant effect of the sales tax price in the general sales tax regressions? One possibility is that the sales tax look up tables are perceived to have no effect at the margin. Another (and not incompatible) possibility is that state policy makers can react in different dimensions to changes in the tax price (or perceived tax price) in ways that offset each other. To consider that possibility, I decomposed the sales tax regressions into rate and base coverage regressions. For the rate measure, I used a weighted average of the sales tax rate at the beginning of the year and at the end, weighted by the month during the year in which the rate changed. The base coverage measure is constructed in two steps. First, I construct a measure of the tax base as the ratio of general sales tax revenues to the sales tax rate. I then divide this base measure by gross state product (GSP) in the state.[18] This variable measures the fraction of economic activity in the state included in the sales tax base. It averages 44% with a standard deviation of 10 percentage points. I have not explicitly controlled for the sample selection bias in the rate and base regressions as I simply ignore states with no general sales tax. Given the small number of

continental states without a general sales tax, sample selection bias is not likely to be a significant problem. Those results are reported in Table 3. As expected, the income tax price coefficient is positive and significant in the rate regression and the sales tax price coefficient is negative and significant. Exporting appears to have no effect on rates.

The surprising result is that the sales tax price coefficient is positive and very significant in the base regression while the income tax price coefficient is negative and significant. A possible reason for this result follows from the fact that businesses pay a considerable amount of sales taxes.[19] Stephen Pollock (1991) has noted that businesses contribute as much as 45% to sales tax collections. One possible response to an increase in the sales tax price is for states to broaden the base so as to tax more purchases made by businesses. While some of those taxes will ultimately be paid by residents, either through higher prices or lower factor prices, much of these taxes will likely be exported to non-residents.

Finally, I turn to the question, "Whose tax price matters?" Feldstein and Metcalf (1987) argued that an average marginal tax price was the appropriate price reflecting coalition building and other complicated interactions in the political arena at the state level. One might take an interest group approach (viz Inman (1989)) and allow for prices of different income groups to enter. Tables 4 and 5 present two different sets of regressions to shed some light on this issue. In table 4, I present regression estimates for the personal income tax share and general sales tax share regressions along the lines of the results in table 2. These regressions differ from those in table 2 by substituting tax prices for returns in different adjusted gross income percentiles for the average tax price (presented in the last column for comparison purposes). Whose tax price matters? One crude way to answer the question is to see which estimated

own-price effect coefficient has the highest t statistic. By this standard, the average marginal tax price wins for the income tax regression and the 75th percentile wins for the general sales tax regression. Limiting ourselves to the percentile regressions, the 95th percentile (along with the 90th) is most important for the personal income tax regressions and the 75th (and perhaps the 50th) percentile for the general sales tax regressions. The cross price elasticities are less informative; however it is interesting that the one significant cross price elasticity occurs in the 75th percentile for the general sales tax regression and has the correct sign. This approach suggests that high income groups are influential with respect to the income tax and upper middle income groups with respect to the general sales tax.

The personal income regressions also provide support for the large own price elasticities implied by the income tax regressions reported here and also reported by Feldstein and Metcalf (1987). For example, the price elasticity for the income tax regression in table 2 is -3.92. Feldstein and Metcalf argue that average tax price elasticities are likely to be substantially greater than elasticities of decisive voters due to the combining of itemizers and non-itemizers in the average tax price. The estimated elasticities for the income tax regression support that story: in all cases, the estimated elasticities are substantially smaller than that derived from the average tax price regression. If the 95th percentile taxpayer is decisive, the appropriate elasticity is -.74, about 20% of the elasticity from the average tax price regression. The two different estimates lead to roughly the same drop in income tax share in response to eliminating deductibility. The mean personal income tax share in my sample is 18.3 while the average tax price for all taxpayers is 91.9 and for the 95th percentile taxpayer is 69.7. Eliminating deductibility of the income tax would mean an increase in the tax price of the average taxpayer of 8.1 points

(100-91.9) and 30.3 points for the 95th percentile taxpayer. The average tax price coefficient of -.781 implies a drop in income tax collections relative to personal income of .781 x 8.1 or 6.33 (a 34% drop) while the estimated coefficient from the 95th percentile regression (-.194) implies a drop of .194 x 30.3 or 5.88 (32%). As this example shows, large elasticities from average tax price regressions are consistent with more modest (and plausible) elasticities from decisive voter tax price regressions.

As a second cut at this question, table 5 presents regressions in which I included tax prices for the 25th, the 50th, and the 95th percentile taxpayers.[20] The story for the personal income and general sales taxes remains unchanged. In the personal income tax regression, the own-price coefficient is negative and strongly significant for the 95th percentile. The coefficient is statistically insignificant for the 25th percentile and significant but the wrong sign for the 50th percentile. Moreover, the sales tax coefficient (cross price effect) is only positive (though statistically insignificant) for the 95th percentile. For the general sales tax regression, the 50th percentile has the correct sign and is statistically significant for the sales tax price coefficient and is positive and significant for the income tax (cross price) coefficient. Both the 25th and 95th percentile coefficient estimates in this regression have the wrong sign and are not statistically significant. The results of these regressions support the findings of table 4: Tax prices of high income groups seem relevant for the income tax while tax prices of middle income groups seem relevant for the sales tax.

VI. Conclusion

Policy makers at the federal level might point to the continuing strong reliance by states on the sales tax and argue that eliminating federal deductibility for state and local taxes will have no consequences for the state and local sector. Results from this analysis suggest otherwise. While

there is not a strong response of sales tax share to changes in its tax price, there is a very strong (and statistically significant) response of the income tax to changes in its tax price. Eliminating deductibility would likely cause a large shift in tax structure away from taxes which had been deductible to taxes which continue to be deductible by businesses.

How then should we explain the insignificant response of sales tax share to changes in its tax price? In the end, I think both the "incomplete deductibility" story and the "distributional" story play a role. There is a degree of responsiveness of rates to changes in sales tax price (table 3) and some responsiveness of sales tax share to changes in tax prices of upper middle income groups (table 4). These results suggest that the deduction generated from "look up" tables is not entirely lump sum. However, exporting concerns likely dampen any desired reductions in sales tax share in response to increases in sales tax price.

However, the regression results also lend some indirect support for the distributional story of Inman and others. Different income groups appear to be concerned with different taxes: upper income groups for the income tax and middle to upper middle income groups for the sales tax. Given this differential set of concerns, policy makers may have chosen to rely more heavily on the sales tax after TRA86 to offset some of the gains to lower income groups resulting from tax reform.

That different income groups are concerned about different taxes suggest a possible benefit tax approach as states struggle to raise money for a wide variety of important services. Linking income tax revenues to services benefiting high income groups and sales tax revenues to services benefiting lower and middle income groups may provide additional political support for state tax systems which increasingly are under attack from residents in many states.

Appendix

The model described in section III assumes that individuals maximize utility over two consumption goods, one of which is taxable at the state level, and leisure. From the utility maximization at the individual level, demand functions for the two goods can be constructed along with a labor supply function. I then assume that the state maximizes individual utility conditional on these demand and supply functions. In other words, the state maximizes the indirect utility function of the individual. I assume that the gross wage and the net price of the commodities (gross and net of taxes) are fixed but that the net wage and gross price are affected by 1) state taxation and 2) federal deductibility. For example, if the gross wage equals 1, then the net wage, w, will equal

$$w = P_Y(1-\tau_s) \tag{2}$$

where τ_s is the state marginal tax rate on wage income, and P_Y is the federal tax price for state income taxes. If the taxpayer does not itemize on the federal return, then the cost of a dollar of state taxes equals one dollar and P_Y equals 1. If the taxpayer itemizes and deducts the tax, then the net cost of a dollar of taxes paid to the state government is $1-\tau_f$ where τ_f is the federal marginal tax rate on wage income. In this case, the net wage (net of federal and state taxes and accounting for federal deductibility) equals $(1-\tau_f)(1-\tau_s)$.[21]

In a similar vein, the gross price of the taxable commodity equals its net price (assumed equal to 1) plus the net sales tax paid to the state (net of the amount deductible on the federal return). If P_s is the tax price for general sales taxes, and t the general sales tax rate, then the gross price (q) is given by

$$q = 1 + P_s t \ . \tag{3}$$

The state government chooses a tax rate on wage income (τ_s) and a general

sales tax rate (t) to maximize individual utility. From the first order conditions for the utility maximization problem, I derive functions r_s^* and t^*, the state's choice of tax rates as functions of the parameters of the model. The critical parameters that I consider in the text are the tax exporting rates and the federal tax prices.

The Tax Reform Act of 1986 eliminated deductibility for general sales tax rates and lowered marginal tax rates for most taxpayers. This latter change had the effect of raising the federal tax price for state income taxes. Algebraically, I characterize the Tax Reform Act of 1986 as

$$dP_s > 0 \tag{4}$$

$$dP_y = \psi dP_s \tag{5}$$

where ψ can be either positive or negative. One might first assume that $0 < \psi < 1$, i.e. that the tax price for state income taxes increased but by less than the increase for state sales taxes. For example, if prior to TRA86, $P_y = P_s = .60$ then $dP_s = .40$ and dP_y is a number like .25, say, and $\psi = .625$. As I noted in Section III, the sales tax look up tables likely underestimate the marginal impact of a sales tax payment. If for example, only half the sales tax payments are allowed as a deduction using the tables, then P_s prior to TRA86 equals .80 rather than .60. In this case, $dP_s = .20 < dP_y = .25$ and $\psi = 1.25$.

Figure 1. Income and General Sales Tax as Fraction of Total Taxes & Charges

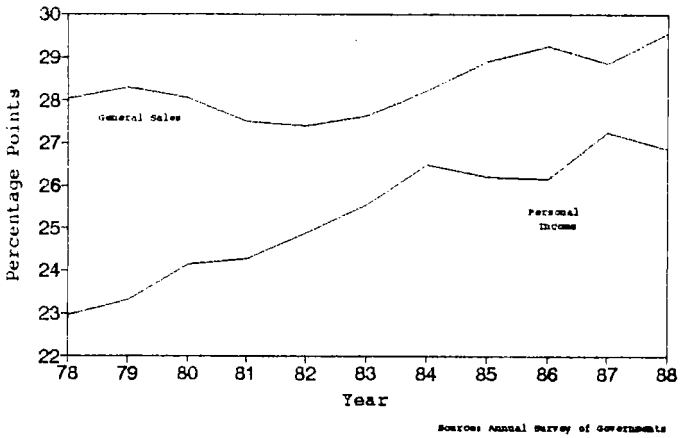

Figure 2. Other Taxes as Fraction of Total Taxes & Charges

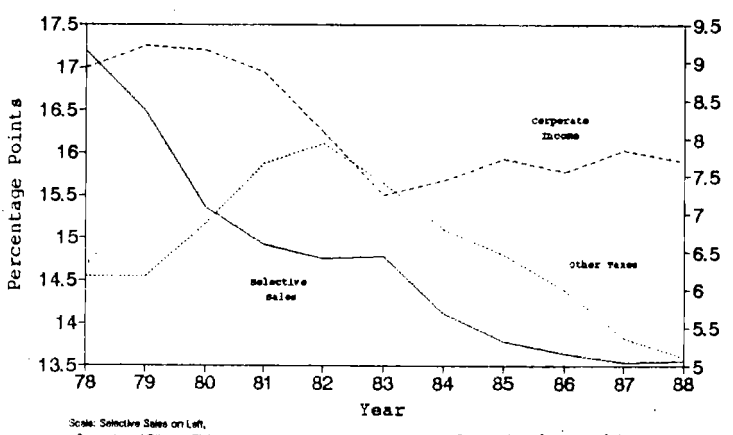

Table 1. Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
Personal Income Tax Share	18.329	11.579	0.000	46.396
General Sales Tax Share	21.922	9.478	0.000	52.553
Selective Sales Tax Share	12.202	3.480	6.043	27.820
Charges Share	16.526	7.158	6.706	55.601
Corp. Inc. Tax Share	5.244	2.701	0.000	13.106
Other Taxes Share	6.703	10.859	0.185	82.758
Income Tax Price	91.916	2.004	83.470	98.240
Sales Tax Price	91.572	3.742	81.590	100.000
Fraction Itemizers	33.080	7.514	13.260	50.920
Export	100.019	12.568	72.000	146.000
Mineral State	0.167	0.373	0.000	1.000
% Age 18-44	42.336	1.964	36.800	48.200
% Age 65 +	11.769	1.828	7.500	17.800
Change in Unemp.Rate	0.003	1.395	-4.170	4.660
General Sales Tax Rates	4.372	1.086	2.000	7.500
Sales Tax Base to GSP (%)	44.342	10.105	24.556	95.122

There are 432 observations (48 states and 9 years) on all but the last two variables. For those, there are 396 observations (44 states and 9 years). See text for definitions of variables.

Table 2. Tax to Income Regressions

Dependent Var:	Personal Income	General Sales	Selective Sales	Charges & Licenses	Corporate Income	Other Taxes
Income Tax Price	-.781**	-.281	.146	.252*	.254**	-.374
	(.189)	(.215)	(.091)	(.115)	(.096)	(.337)
Sales Tax Price	.114*	-.018	-.011	-.092**	-.047	.005
	(.058)	(.067)	(.029)	(.036)	(.030)	(.105)
Exporting	.026	.084**	-.027**	.010	.036**	.058
	(.018)	(.020)	(.008)	(.011)	(.008)	(.032)
%Age 18-44	-1.119**	-1.447**	- .509**	-.748**	-.269	.453
	(.339)	(.387)	(.164)	(.206)	(.173)	(.606)
%Age 65 +	-.095	1.164*	.632**	.654*	-.021	-2.403**
	(.470)	(.536)	(.228)	(.285)	(.241)	(.841)
Change in Unemployment Rate	-.484**	-.325**	-.074	-.154**	-.003	-.001
	(.085)	(.098)	(.041)	(.051)	(.043)	(.153)
Trend	.511**	.504**	-.041	.286**	.080	.099
	(.118)	(.135)	(.057)	(.072)	(.060)	(.212)
$\bar{R}^2$	.971	.944	.925	.972	.862	.895
CFE	23.4	11.9	26.5	6.9	15.6	20.5
P-Value	(0.00)	(0.06)	(0.00)	(0.34)	(0.02)	(0.00)

* - significant at 5% level (two sided)
** - significant at 1% level (two sided)

For each regression, the dependent variable is tax collections as a fraction of aggregate personal income. The regressions are for the 48 continental states for the 9 year period from fiscal year 1980 to 1988. There are 432 observations. Regressions include fixed effects for the 48 states. CFE is a Chi-Square statistic (6 d.f.) testing for correlated fixed effects.

Table 3. General Sales Tax Rate and Base Regressions

Dependent Var:	Rate	Base
Income Tax Price	.352**	-1.462**
	(.073)	(.637)
Sales Tax Price	-.106**	.668**
	(.028)	(.245)
Exporting	.001	.172**
	(.006)	(.053)
Real Per Capita Income	.294**	-2.422**
	(.051)	(.439)
Mineral State	.185	2.680
	(.168)	(1.459)
%Age 18-44	-.077	-2.337**
	(.064)	(.559)
%Age 65 +	-.071	-.530
	(.059)	(.508)
Change in Unemployment Rate	-.057	-.024
	(.036)	(.314)
Trend	.102**	.454
	(.030)	(.260)
$\bar{R}^2$	.405	.483

* - significant at 5% level (two sided)
** - significant at 1% level (two sided)

The dependent variable is the effective sales tax rate or the ratio of the implicit tax base to Gross State Product. The regressions are for the 44 continental states with a general sales tax for the 9 year period from 1980 to 1988. There are 396 observations. All regressions have indicator variables for nine Census regions and use instrumental variables for the tax price variables.

Table 4. Percentile Regressions

Personal Income Tax Share Regressions

Percentile	50	75	90	95	99	AVG
Income	-.223	.022	-.107*	-.194**	-.007	-.781**
Tax Price	(.230)	(.104)	(.049)	(.053)	(.024)	(.189)
	[-1.18]	[.10]	[-.44]	[-.74]	[-.02]	[-3.92]
Sales	.058	-.006	.012	.012	.001	.114
Tax Price	(.142)	(.041)	(.017)	(.015)	(.011)	(.058)
	[.03]	[-.03]	[.05]	[.05]	[.003]	[.57]
$\bar{R}^2$	.971	.972	.971	.965	.972	.971

General Sales Tax Share Regressions

Percentile	50	75	90	95	99	AVG
Income	.214	.478**	-.094	.076	.049	-.281
Tax Price	(.262)	(.132)	(.056)	(.058)	(.028)	(.215)
	[.94]	[1.90]	[-.32]	[.24]	[.14]	[-1.18]
Sales	-.291	-.180**	-.017	-.025	-.017	-.018
Tax Price	(.161)	(.053)	(.019)	(.015)	(.013)	(.067)
	[-1.28]	[-.71]	[-.06]	[-.08]	[-.05]	[-.07]
$\bar{R}^2$	.945	.933	.943	.943	.944	.944

* - significant at 5% level (two sided)
** - significant at 1% level (two sided)

These regressions are identical to those in table 2 except for the change in tax price variables. Standard errors are reported in parentheses and elasticities evaluated at the means in brackets.

Table 5. Income Group Regressions

Dependent Variable	Personal Income	General Sales	Selective Sales	Charges & Licenses	Corporate Income	Other Taxes
Income Tax Price Percentile						
25	-1.683	-2.390	.470	-.481	-3.211*	-.371
	(3.175)	(3.218)	(1.356)	(1.488)	(1.448)	(5.204)
50	1.723**	1.849**	.367	.289	.644	-2.955**
	(.760)	(.771)	(.325)	(.357)	(.347)	(1.246)
95	-.376**	-.142	-.007	.015	.040	.281
	(.123)	(.125)	(.053)	(.058)	(.056)	(.202)
General Sales Tax Price Percentile						
25	-1.683	1.601	.132	.219	2.333	-.159
	(2.796)	(2.834)	(1.192)	(1.309)	(1.272)	(4.574)
50	-1.574*	-1.787**	-.438	-.288	-.447	2.561*
	(.697)	(.706)	(.297)	(.326)	(.317)	(1.140)
95	.166	.138	.053	.011	-.002	-.262
	(.089)	(.090)	(.038)	(.041)	(.403)	(.147)
$\bar{R}^2$	.948	.920	.895	.970	.807	.843

These regressions also include the variables found in table 2.

* - significant at 5% level (two sided)
** - significant at 1% level (two sided)

ENDNOTES

[1] Conceptually, there is no reason to treat the two types of exporting differently. It is useful to do so though to emphasize the influence of federal tax policy on state and local tax policies.

[2] See, for example, Martin Feldstein and Gilbert Metcalf (1987), Douglas Holtz-Eakin and Harvey Rosen (1988), Lawrence Lindsey (1988), Robert Inman (1989) and Mary Gade and Lee Adkins (1990).

[3] Examples of the average tax price literature include many of the papers cited in footnote 2.

[4] For the purposes of this analysis, I include charges and licenses in tax collections. These data come from the U.S Bureau of the Census State Tax Collections and are adjusted using the methodology of John Due and John Mikesell (1983). In particular, various states include certain business taxes in the general sales tax figures prepared by the Census Bureau. I include those in the "other" category. Taxes on motor vehicle sales as well as hotel and meal taxes are added to the general sales tax category. Other minor changes are made to create a consistent set of series.

[5] The model is elaborated more fully in an appendix. Complete details and derivations are available upon request from the author.

[6] Measuring the tax price for individual state taxes is slightly more complicated in practice. I describe some of the complications and the methodology I used for constructing tax prices in the next section of this paper.

[7] See for example the discussion on page 140 of Reschovsky and Chernick (1989).

[8] Robert Ebel (1992) argues that this is in fact what happened.

[9] Presumably, direct policy instruments would be a more efficient device for carrying out redistribution than this indirect approach. Political constraints may preclude such a direct approach however.

[10] This data set contains detailed information from federal tax returns for anywhere from 85,000 to 160,000 filers per year.

[11] See ACIR (1990). Also see footnote 12 below.

[12] In 1989, six states allowed deductions for state income taxes but not for state general sales taxes while one state (Kentucky) allowed a deduction for state general sales taxes but not for state income taxes (ACIR, 1990). The greater number of states showing a preference for the state income tax reflects the tendency of state income taxes to define their tax base according to federal definitions.

[13] An additional benefit of using TAXSIM is the ability to construct instrumental variables to control for the endogeneity in the tax price variable noted above. Higher levels of state taxation increase the probability of itemizing which in turn reduces the tax price for that particular tax. This leads to a negative correlation between the residual in a tax regression and the tax price variable. Second, higher levels of a particular tax taken as a deduction may push the taxpayer into a lower tax bracket which increases the tax price and leads to a positive correlation between tax share residuals and the measured tax price. I construct three instruments for the tax price using TAXSIM. A "first dollar" tax price can be constructed by zeroing out the deductions reported by taxpayers and computing a marginal tax rate on wage income. Call this τ_0. I then impute a probability of itemizing to each taxpayer based on national itemization rates conditional on the returns adjusted gross income and number of dependents. Call this p_n. Then the first dollar measure of tax price would equal

$$P_0 = 1 - p_n \tau_0.$$

A "last dollar" tax price instrument is constructed as follows. Instead of zeroing out tax deductions, I replace the reported deductions with the average amount reported nationally by a taxpayer of the conditioning variables and compute the marginal tax rate on wage income. Call this τ_n. The last dollar tax price then is

$$P_L = 1 - p_n \tau_n.$$

The third instrument is p_n. Note that I need at least two tax prices, one for the income tax price and the other for the sales tax price. The advantage of these instruments is that they control for both forms of endogeneity and can be constructed at the micro level (i.e. for each tax payer)and aggregated to a statewide level.

[14] Alaska and Hawaii are eliminated from the study to be consistent with previous research in this area. Hawaii has a unique state-local relationship which may make it more similar to large cities than to other states.

[15] The correlation is 0.69 over the sample period during which the general sales tax is fully deductible.

[16] The retail sales measure also includes sales to industrial, retail, and other business firms so long as the sale is a final sale. Therefore, a high sales activity index may also reflect exporting to non-residents through business sales taxes which may in large part be exported.

[17] Previous research by Holtz-Eakin and Rosen (1988) as well as research on municipal debt supply by Metcalf (1991) suggest the importance of correlated individual effects in models of state or local revenue structure. State sales tax rates change slowly over time and removing the across state variation through the use of first difference or fixed effects estimation removes most of the information in the data. Adding dummies for Census region in those regressions seems a reasonable compromise. I test for correlated fixed effects in all the fixed effects regressions and generally reject zero correlation between explanatory variables (and instruments) and fixed effects.

[18] Gross State Product data are constructed by the Bureau of Economic Analysis (BEA) and provide a good measure of economic activity within the state. However, the series is only available up through 1986. For the missing two years, 1987 and 1988, I extrapolate GSP for each of the 50 states by fitting a regression for each state of GSP on personal income and lagged GSP. This simple approach has the virtue of fitting the data very well as well as picking up major turning points in the data for the vast majority of the states.

[19] I am indebted to Helen Ladd for this idea.

[20] These percentile prices are not highly correlated. For the income tax price, the correlations range from .005 to .433 with the maximum correlation between the 90^{th} and 95^{th} percentile. The average correlation is .288.

[21] This measure is complicated by the fact that some states allow a deduction for federal income taxes on the state income tax. In this case the net wage equals $1 - (m(1-\tau)+\tau(1-m))/(1-m\tau)$.

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