

Base Mobility and State Personal Income Taxes¹

Donald Bruce
(dbruce@utk.edu)

William F. Fox
(billfox@utk.edu)

Zhou Yang
(zyang2@utk.edu)

Center for Business and Economic Research
804 Volunteer Blvd., Temple Court Building
The University of Tennessee
Knoxville, TN 37996
(865)974-5441
<http://cber.bus.utk.edu>

September 2008

ABSTRACT: Despite their prominence in state tax portfolios, state income taxes have received much less attention in the literature on behavioral responses to taxes. Consequently, decisions are often made without the needed evidence on response elasticities. In the spirit of the growing literature on the elasticity of taxable income, which has primarily considered federal taxes using individual data, we estimate state-level panel regressions of state personal income tax bases on state tax rates, structures, and other controls. Measuring state personal income tax bases is notoriously difficult, so we compare actual data gathered directly from state revenue officials with two other proxies: tax collections divided by the top marginal tax rate and total adjusted gross income on federal returns from each state. Results generally indicate that state tax rates on wage income have no impact on the actual tax base and only a small positive effect on the calculated base, but they have a larger effect on federal AGI. This suggests that individuals could be filing federal returns from higher-tax-rate states but are not necessarily reporting the same income to those states for state tax purposes. We also find that the tax rate on capital income is positively associated with state personal income tax bases. This might be picking up tastes for public services, to the extent that more mobile higher-income taxpayers move their entire tax bases to states with more or better services (and higher tax rates). Similarly, we find that the tax rate on pension income increases actual state base data while reducing the calculated base and federal AGI. The latter results might indicate that taxpayers with pension income prefer lower-tax-rate states and bring small tax bases with them when they relocate. It is important to note that, with the exception of tax rates on pension income, we find little to no evidence that higher state tax rates reduce personal income tax bases.

¹ Paper prepared for the conference on “Mobility and Tax Policy: Do Yesterday’s Taxes Fit Tomorrow’s Economy?” University of Tennessee, October 2-3, 2008. We are grateful to Jon Rork and Gary Wagner for providing data on state reciprocity agreements, to John Deskins for invaluable assistance with other data matters, and to Michael Smith for excellent research assistance.

Introduction

The effects of state and local taxes—particularly property and corporate income taxes—on behavior have been broadly studied over the past several decades. Much of the research has focused on the effects of those taxes on the location of economic activity, though other dimensions have also been analyzed.² State and local personal income taxes have been studied much less extensively despite the fact that personal income taxes are the predominant state tax. Further, anecdotal evidence suggesting that high income taxes harm economic growth has been a factor in proposed (and sometimes enacted) tax reforms in states such as Ohio, South Carolina and Kentucky. The policy analysis is primarily based on conjecture.

State income tax policy decisions are made with little information on how tax bases actually respond to rate and base structures at the state level. The extent to which the base responds to rate changes has a wide range of implications for policymakers, encompassing the resulting changes in expected tax revenue, the level and location of state economic activity (including workers and businesses), and others. This paper seeks to help fill the void by expanding the very limited research on how personal income tax structure affects the levels of state personal income tax bases. The responsiveness of state tax bases to tax rates reflects the aggregation of all behavioral responses rather than a single response, such as work effort. In this sense, our work represents an aggregate-level companion to the growing literature on the elasticity of taxable income, most of which has focused on federal taxes and individual data.

Following a very brief review of state personal income taxes, we characterize many of the ways in which individuals respond to personal income taxes. We then discuss several relevant strands of the previous literature before discussing our estimation approach and data

² For example, see Wasylenko (1997) for a summary of the research on location effects and Bruce, Deskins, and Fox (2007) for the broader effects of corporate taxes.

sources. Following a presentation of our empirical results, we conclude with a summary and discussion of possible avenues for further work in this area.

State Personal Income Taxes

Forty-one states currently impose a broad-based personal income tax, and two others, Tennessee and New Hampshire, impose a tax only on certain forms of capital income. Although a larger number of states (45) have general sales than income taxes, the personal income tax is the largest state tax instrument, raising 35.4 percent of tax revenues.³ The share of revenue contributed by income taxes has generally been rising, having increased from 31.4 percent in 1994. The average national share raised by the tax provides little insight into the behavior of individual states, which differ radically in their reliance on the tax. Five states generate more than 50 percent of revenue from the income tax, led by Oregon (72.4 percent). Seven states raise no revenue from the tax.

Thirty-four states use progressive rates and the others impose flat rate taxes. Maximum state marginal rates vary from a low of 3.0 percent in Illinois (a flat rate structure) to a high of 9.5 percent in Vermont (which has rates ranging up from 3.6 percent). California has a maximum 9.3 percent rate but imposes a 1.0 percent surcharge on taxpayers with income above \$1.0 million.⁴ The maximum marginal tax rate in progressive rate states is often, though not always, reached at relatively low levels of taxable income. For example, 13 states reach the maximum rate by \$20,000 of taxable income and only seven states reach the maximum rate at taxable incomes above \$100,000.

³ See <http://www.taxadmin.org/fta/rate/07taxdis.html>

⁴ See http://www.taxadmin.org/fta/rate/ind_inc.html

State marginal rates have generally been declining over the past several decades, though as with almost any state tax question there are wide differences. Twenty-three states impose lower maximum rates now than in 1985, with decreases of over 5.0 percentage points in Minnesota and New York. Ten states have raised their marginal rate, led by New Jersey where the rate has been increased by 5.47 percentage points, but five of these states increased the marginal rate by 0.5 percentage points or less. Also, Connecticut added an individual income tax in 1991. On average, the highest marginal tax rate has been lowered by just over one percentage point since 1985. The growing share of revenue provided by the income tax illustrates the tax's high-income elasticity since the rates have generally been trending downward (see Bruce, Fox, and Tuttle, 2006, for example).

States often calculate taxable income after beginning with a federal definition of income and then making certain adjustments. Twenty-seven states begin with federal AGI and nine start with federal taxable income.⁵ Exemption for federal interest earnings is an adjustment made by all states. States also differ in the breadth of their base, depending on how they handle such issues as taxation of pension income, ability to use itemized and standard deductions, and other aspects of the tax structure.

Base Mobility and Personal Income Taxes

At least three sets of potentially overlapping taxpayers or income earners might be responding to state personal income tax structures: wage earners, capital income earners, and pension recipients. The tax base associated with each set of taxpayers may be mobile, but potentially through different avenues. Wage earners may alter their work experience in ways that have generally been considered through analysis of the federal income tax, such as by reducing

⁵ See http://www.taxadmin.org/fta/rate/inc_stp.html

hours worked, leaving the labor force, changing positions, and shifting the receipt of taxable versus nontaxable (or tax-deferred) compensation. State tax structures raise the potential for wage earners also to change where they earn taxable income. Thus, they may relocate to lower tax jurisdictions, whether by choosing to live and work on the low-tax side of state borders within a single labor market or by moving across wider geographic areas. Wage earners may change their behavior by working in multiple states and by evading taxes through misreporting more of their income to lower tax rate states. It is not clear whether reciprocity agreements between states, which are intended to simplify tax compliance and reduce or eliminate double-taxation of earnings, increase or decrease the degree of base mobility among wage earners. That said, reciprocity agreements reduce the tax consequences of living in one state and working in another.

Recipients of employer-based pensions or tax-deferred pensions may choose to receive pension benefits in low rate jurisdictions after earning the associated income in higher rate jurisdictions. Capital income earners may choose to shift where they take receipt of capital income, by for example, establishing residence in a low tax jurisdiction, or by using alternative business structures to shift receipt of income. They also may engage in tax avoidance by placing part of their portfolio in non-taxable assets, such as federal securities.

The sensitivity of the base is likely to differ according to the demographics of taxpayers. Upper-income taxpayers may face higher marginal tax rates, and thus a greater incentive to respond to tax rates. They often earn relatively more capital income, and the capital income is likely more mobile than labor income because it is generally not as constrained by geography as

labor income.⁶ These differentials across taxpayers cannot be fully addressed in this paper, but an effort is made to examine some aspects of demographic details across states.

Individual taxpayers may belong to more than one of the broad taxpayer groups, and the effects on the aggregate taxable income elasticities are difficult to discern. The result can be mixed incentives that attenuate the measured responsiveness. For example, individuals who earn most of their income from work effort may nonetheless choose to work in high rate jurisdictions because of broader job related characteristics but will also receive their capital income in the state unless they are able to establish locations in multiple states. This could make capital income less mobile and therefore less responsive to rate differentials than would be the case if all income was earned in this manner. On the other hand, high tax rates provide reinforcing incentives to receive both capital and labor income in low-income states. For example, an individual may not move to avoid high taxes on labor income alone, but reaches a sufficient threshold to relocate when capital income is also subject to the higher tax rates. The result could be more mobile tax bases than for a single form of income.

Previous Literature

Our goal in this paper is to analyze the responsiveness of the aggregate personal income tax base to tax rate differentials in the spirit of the taxable income elasticity literature. The taxable base elasticity approach is appropriate because the intent is to investigate the net effect of all tax responses to personal income tax rates. As summarized by Feldstein (1995), the overall elasticity of taxable income provides a much more inclusive sense of the excess burden of the tax. According to Giertz's (2007) useful overview of the empirical literature and issues in this

⁶ Of course, technology allowing remote work to be undertaken more easily could be making labor more mobile to tax structures as well.

area, recent estimates place the overall elasticity of taxable income between 0.1 and 0.4. In other words, taxable income tends to rise by 1 to 4 percent as the net-of-tax rate (1 minus the marginal tax rate) rises by 10 percent. Of course, estimates vary both within and across time for a variety of reasons. Indeed, the combination of better data, better methods, and a generally narrower tax base have contributed to a slight decline in the estimates in recent years.

Most of the prior work in this area has focused on federal taxes using individual data. Long (1999) has undertaken the only state level estimate of taxable income elasticities for the personal income tax. His estimates of the elasticity of taxable income with respect to the net-of-tax rate, which ranged from about 0.2 to 0.8, were slightly higher than more recent estimates. Long (1999)'s use of cross sectional data for 1991 might limit the representativeness of his results, however, due to the recession at the time.

Many other related studies have been undertaken, though they generally focus on selected aspects of personal income taxes and suffer from the same disadvantages that led researchers to begin focusing on taxable income elasticities. Limited work has been done on the effects of state and local taxes, and specifically personal income taxes, on migration. Fox, Herzog, and Schlottmann (1989) examined how fiscal variables affect the propensity to move within a metropolitan area, away from a metropolitan area and into a metropolitan area. They found that high state and local income taxes discouraged people from moving into a metropolitan area, but found no effects on the other decisions. Knapp, White, and Clark (2001) estimated a nested logit model and found what they describe as an anomalous result: higher state income tax liabilities encourage people to stay. They posit that the income tax is a proxy for public services.

Several studies have also looked at how the personal income tax affects economic activity, whether measured by employment or Gross State Product. Wasylenko and McGuire

(1985) found almost no evidence that the personal income tax affected employment. Carroll and Wasylenko (1994) extended this earlier research by examining the effects of fiscal variables on total and manufacturing employment for two separate time periods, including the one examined by Wasylenko and McGuire. High personal income tax rates were found to reduce total employment in the latter time period but had no effect on manufacturing employment during either time. Their overriding observation is that the measured effects of fiscal variables are unstable across time and cannot be regarded as definitive.

Bruce, Deskins and Fox (2007) used instrumental variable regressions to investigate corporate tax base fluctuations from 1985 through 2001. The maximum personal income tax rate was included in both the first stage regression of GSP on exogenous variables and instruments and the second stage regression of the corporate tax base on a variety of determinants. The top personal income tax rate was found to have a relatively strong negative effect in both equations.

Estimation Approach and Data Sources

Our principal goal with this paper is to investigate how tax structure characteristics influence state tax bases. Our baseline model, where i indexes state and t indexes year, is as follows:

$$TB_{it} = a_i + b_t + cT_{it} + dM_{it-1} + eX_{it} + f_{it}.$$

TB_{it} is state i 's personal income tax base in year t , a_i is a vector of state fixed effects, b_t is a vector of year fixed effects, c , d , and e are vectors of estimable coefficients, and f_{it} is a disturbance. T_{it} is a vector of tax rates, M_{it-1} is a vector of migration variables, and X_{it} is a vector of other control variables. We discuss specific details pertaining to each component of this baseline approach in turn below.

Measuring State Personal Income Tax Bases

While the ideal data set for such an analysis might be taxable base data taken from a panel of state tax returns for individual taxpayers from multiple states, such data are not available. Fortunately, three aggregate data sources can be considered for measuring the effects of the state personal income tax structure on state tax bases: data on actual state tax bases gathered from official state sources, data compiled from individual federal tax returns and aggregated by state, and proxies for state tax bases that are calculated from available sources.

There are several dimensions to choosing the best data source, and we believe that each offers some advantages. We note that all of our aggregate tax base options share the common disadvantage relative to individual data, in that we are unable to allow for individual-specific tax bases (e.g., taxable income) and marginal tax rates. The aggregate sources provide more information than might be immediately apparent, however. As one example, aggregate data smooth out effects of life cycle responses that might be difficult to investigate within individual data. People might respond differently during environments when they have either unusually high or low income levels or are at different stages in their life. When appropriate, we compare results across each of these data sets in the empirical section.

Both individual and aggregated data on taxable income or AGI drawn from individual federal tax return data potentially reflect some responses to state personal income taxes such as changing work effort or changes in residence. That said, federal tax return data are based on the state from which people file their federal returns. These data essentially presume that people work and receive all income within a single state and do not allow for the examination of many types of cross state reactions. The largest effects of state taxes on behavior may be the ways in which people choose to receive income across states, and the federal data will not recognize that

people earn income in more than one state. In fact, many people file state income tax returns in more than one state, and they may be doing so in order to evade or avoid paying taxes.

Recognizing this issue and similar problems with other available aggregate data sources (see below), we have directly gathered data on actual state income tax bases from a large number of states. Those data show that residents' tax returns on average represent only 77.2 percent of the total tax base for all returns in the state.⁷ Among the states for which we have sufficient data for analysis, we find that the residential share varies from 66.7 percent in Utah to 95.4 percent in Hawaii. The key advantage of aggregated state data is that they permit an analysis of the full range of responses to taxes, including cross-state choices. We want to examine the full range of effects, but we compare these findings with those arising only from federal returns.

Unfortunately, while actual (as opposed to computed or proxied) state tax base data are preferred, state tax return data are not available from any general source in any consistent manner across states. Our extensive efforts to contact every state with a personal income tax to request actual tax base data was met with some success. We were able to collect actual base data (state adjusted gross income) based on all tax returns for 14 states over a varying period of time, yielding a total of 186 state-year observations. We were also able to gather similar data, but from tax returns for residents only, for 19 states over a varying period of time, yielding a total of 260 state-year observations. However, given our primary interest in base mobility among all filers in a state and not just that state's residents, we focus on the all-returns panel in this paper.

We also make use of a third broad measure of aggregate state personal income tax bases, which is a proxy calculated as tax collections divided by the maximum tax rate. This approach

⁷ We note that while some states provided non-resident data only for the portion of non-resident income that is taxable in the state, several others provided the entire income for non-residents. Given that the definition used by any one state is constant over time, our inclusion of state fixed effects will account for any issues raised by this difference.

raises the possibility of division bias (given our inclusion of the tax rate as an independent variable), though this is attenuated to some extent by the fact that many states levy flat-rate personal income taxes and others have progressive rates but only over a small range of income. Key advantages of this calculated state tax base measure include the fact that it is available for all income-taxing states and it more closely resembles the actual state tax base than measures gleaned from federal tax returns.

While we only have actual state base data for those states that provided it in response to our request, we have the base data from federal tax returns for all states. We will obviously only have the calculated base data for states with income taxes, though. In order to enhance our ability to make comparisons across the federal and calculated base data, we supplement the calculated base data with federal taxable income for the states that do not impose a personal income tax or only tax capital income.

State AGI differs from federal AGI because of definitional differences, such as taxation of federal versus state/local interest, and because of non-resident income. On average, state AGI exceeds the federal AGI by 15.9 percent in our sample. This is expected since the state base will generally include all income for residents (even if they earned income out of state) and will also include income earned in the state by non-residents. But states differ dramatically, with four states having state AGI more than 40 percent above federal AGI, and three states having state AGI lower than federal AGI.⁸

In sum, we are able to explore three broad measures of state income tax bases: the total base (AGI) from federal returns filed from each state, the actual total state base (AGI) gathered directly from state revenue officials, and the calculated base (a measure of taxable income

⁸ We note that some states with state AGI more than 40 percent above federal AGI are among those states that include all non-resident income in the state tax base data that were reported to us.

calculated as collections divided by the top rate). Comparisons of our analysis across these sources will provide different and interesting insights. The various sources of data can reflect different perspectives regarding the deadweight losses associated with estimated base-rate elasticities. For example, the actual and calculated state tax base measures allow us to take the perspective of an individual state, which will be concerned not only with changes in the level of real activity, but also with changes in the state in which real activity takes place and changes in the state where income is reported (perhaps as a result of tax planning). These two measures also allow us to include the effects of individuals who work or receive income in multiple states.

Similar elasticities calculated using the federal data are more akin to a national view because many responses that shift activity from one state to another, either through tax planning or by engaging in some work outside of a state, are only reflected by the excess burden from the move, but not from a loss of activity. Much of the response observed with federal data represents real reductions in economic activity, though the federal data also include responses when workers relocate to another state or engage in international tax planning. Thus, elasticities estimated with national data can be seen as an upper bound in terms of the real economic effects.

Yet another important difference to keep in mind throughout our analysis is that two of our proxies for the tax base are measures of AGI, while the third (the calculated tax base) is a surrogate for taxable income. It is not clear whether one or the other should be more responsive to tax rates and other factors. We estimate elasticities below using all three of our tax base measures, and use the comparison to provide a measure of the distinction between cross-state and other effects that represent losses in real national economic activity and those that do not represent reductions in national economic activity.

Tax Variables

We include four tax rate variables in our estimation models. The first three are the state's average marginal tax rates on wage income, capital income, and pension income, and the fourth—analyzed separately from the first three—is the state's top marginal personal income tax rate. The first three tax rates, drawn from the NBER TAXSIM Model, are used in the baseline estimates because they are a better measure of the marginal tax rates actually confronted by taxpayers.⁹ The rates are calculated using the same nationally representative sample from 1995 with proper adjustment for inflation for each state and year, which allows for comparisons of law without confusing changes in income and deductions with changes in law. Another advantage of these rates is that they are perhaps less susceptible to division bias in our analysis of the calculated tax base described above.

In the interest of isolating the true effect of tax rates on tax bases, we also control for other relevant features of state personal income tax systems and tax filing populations. We account for the differing base mobility by type of income by including the percentage of total income that is represented by dividends, interest and rent. We enter this in index form, with each state's value expressed relative to the national average in each year. This index variable is interacted with tax rates on capital income to allow the effects of those tax rates to vary with the level of the index.

Almost every state uses federal AGI or federal taxable income as a starting point for determining state taxable AGI and taxable income. Since some states changed their starting point during the period of our analysis, we include a dummy variable to account for any impacts of a change in the starting point on our base measures. We also include the corporate income tax rate

⁹ <http://www.nber.org/~taxsim/state-marginal/>. Note that TAXSIM doesn't directly provide the tax rates on capital income but it provides the tax rates on dividends, interest and long-term capital gains. We use the national share of each type of income as a weight to calculate the average marginal rate on capital income.

to account for the possibility that our estimated elasticities reflect shifts between corporate and non-corporate activity rather than changes in the underlying behavior (Slemrod, 1998, and Saez, 2003).

Our final tax-related variable is an indicator of the extent to which states have entered into reciprocity agreements with other states. The reciprocity agreements allow labor income earned in a non-resident state to be taxable in the home state (with the work state withholding for tax purposes). Reciprocity agreements are almost always between bordering states. Our measure of reciprocity for each state is calculated as total personal income across the states that have reciprocity agreements with that state divided by the state's own personal income. We interact this variable with the tax rate on wage income in order to allow the tax rate effect to vary with reciprocity status.

Migration and Other Control Variables

As a direct measure of actual personal income tax base mobility, we include levels of in-migration and out-migration, such that the effects of tax rates and structures are measured while holding cross-state migration constant. Migration is measured for our purposes by the movement of federal tax returns across state lines as drawn from state-to-state migration from the IRS Statistics of Income. These migration variables are lagged one year to mitigate endogeneity concerns, and are also interacted with tax rates and the capital income index variable so that the effects of those variables are permitted to vary with the extent of migration.

Since personal income tax bases are expected to fluctuate with state economic conditions, we also include gross state product and the state-level unemployment rate in our models. While movements in the tax base are generally expected to track movements in GSP, our inclusion of GSP is also intended to control for scale differences across states. For example, as shown in

Appendix Table 1, state tax bases vary quite widely within our data. The unemployment rate is included to account for any cyclical effects on tax base that are not picked up by GSP.

We include two separate indicators for whether the state house and senate are controlled by a majority from the Democratic party. These variables are included to proxy for differences in tastes for taxes and public services that are not accounted for with the tax structure variables. Finally, we include fixed effects for state and year in order to account for other factors of the state-invariant or time-invariant variety.

Summary statistics for the variables are reported in Table 1 in Appendix. A few observations about the tax rates are useful. The maximum nominal marginal tax rate for PIT ranges from 0 to 14.0 percent, with a simple average of 5.79 percent. The TAXSIM estimated marginal rate is highest on average for capital income and lowest for pension income. The TAXSIM rates are lower on average than the top marginal tax rate. The corporate income tax rate is on average higher than the personal income tax rate.

Results

Results from three separate versions of our baseline model, each using a different measure of the personal income tax base, are shown in Table 1. Column 1 uses the aggregate actual tax base collected from individual states, Column 2 uses the calculated state tax base (together with federal taxable income for the states that do not have a broad-based personal income tax), and Column 3 uses aggregate AGI from federal individual income tax returns. The maximum time period is 1989 to 2006 for the 14 states for which we have actual base data. We have full data for 1989 to 2006 for the other two base measures. Except for dummy variables, all

regression variables are entered in natural log form.¹⁰ Given the number of interactions in each model, we provide combined elasticity estimates (using either the means or maximum values of interacted variables in cases where interactions are statistically significant) in Table 2.

We begin with a discussion of our tax rate results in Column 1 of Table 1. Effects of the tax rates must be viewed in terms of the combination of their direct effects and the interaction effects.¹¹ While the direct effect of the tax rate on capital income is unexpectedly positive, our results show that the effect becomes less positive (or more negative) as the capital share of income rises relative to the national average. That said, the combined elasticities shown in Table 2 are positive for the tax rate on capital income at the mean level of the capital income index. The tax rate on pension income only has an effect through its interactions with the migration variables. Specifically, we find that higher tax rates on pension income increase the personal income tax base as out-migration rises and reduce the base as in-migration rises. The combined elasticity is positive at mean values of the migration variables.

Both of the estimated direct effects of migration are statistically significant, but with unexpected signs. However, the net effect of migration depends on the interactions with the tax rate on pension income and the capital income index. We find that out-migration actually increases the tax base, and that effect rises with the tax rate on pension income, but the overall effect falls with the capital income index. We find opposite effects for in-migration.

In general, state personal income tax bases tend to rise with the capital income index, but the effect rises with in-migration and falls with out-migration and the tax rate on capital income.

¹⁰ Note that we add 1 to all tax rates in order to be able to take natural logs of the complete distribution, including zero values. Additionally, our estimates are not directly comparable to earlier elasticity-of-taxable-income estimates, which typically include the net-of-tax price rather than the tax rate itself. We prefer the use of tax rates themselves since the tax rates are the policy variables in question. To compare our elasticities to earlier results, though, one need only multiply our elasticities by $(\tau-1)/\tau$, where τ is the average tax rate.

¹¹ A series of joint significance tests for the base and interaction effects of interacted variables revealed combined statistical significance in all cases.

The combined elasticity at the mean capital income tax rate and migration levels is positive but small relative to the other combined elasticities. This is intuitive; states with more capital income as a share of total income (relative to other states) tend to have larger personal income tax bases.

The personal income tax base elasticity with respect to GSP is 0.89, which is statistically different from zero but lower than estimated elasticities of tax bases or revenues with respect to personal income,¹² which suggests, as expected, that the high revenue elasticities come from the rates and other structural characteristics and not from growth in the taxable economy. Of course, the GSP elasticity is calculated while holding constant many other things including the unemployment rate and migration.

Results are quite different when we use the calculated state personal income tax base, which is a measure of taxable income rather than AGI (Column 2), or federal AGI by state (Column 3). We continue to find a large positive base effect of the tax rate on capital income that is offset somewhat by a negative interaction effect with the capital income index. Combined elasticities at the mean value of the capital income index continue to be positive, however (Table 2). The tax rate on pension income is found to have a negative base effect, offset somewhat by a positive interaction with out-migration in the federal AGI model in Column 3. The capital income index is found to have a negative effect on both the calculated base and federal AGI, suggesting that states with relatively higher shares of income from capital tend generally to have lower personal income tax bases by these two measures.

Migration has no statistically significant impact on the calculated base (Column 2), but it exerts the expected influences on federal AGI (Column 3). Specifically, after accounting for the various significant interactions, we find a negative impact of out-migration and a positive impact

¹² See Bruce, Fox, and Tuttle (2006).

of in-migration on federal AGI. Given the nature of the migration and federal AGI data, this is unsurprising.

Turning to the other control variables in the models, we find that the top corporate income tax rate only has a statistically significant effect on the personal income tax base in the calculated base model (Column 2). While that effect is negative, it is quite small in magnitude. In the federal AGI model (Column 3), we find that states with a higher reciprocity index (i.e., that have more personal income in states with which they have agreements, relative to their own personal income) tend to have more federal AGI, but that effect erodes as the tax rate on wage income rises. A possible explanation for this effect is that reciprocity agreements might reduce tax evasion on out-of-state labor income. Finally, we observe an unsurprising negative effect of the unemployment rate on the personal income tax base in both Columns 2 and 3.

A comparison of the combined elasticity estimates across the three models in Table 2 provides several interesting pieces of information. First, we find that the tax rate on wage income has no significant impact on the actual tax base and only a small positive effect on the calculated base, but it has a larger effect on federal AGI. That the wage tax rate increases federal AGI but not the actual tax base as reported by states is at least suggestive evidence of tax planning; individuals file their federal returns from higher-tax-rate states but do not necessarily report the same income to those states for state tax purposes.

Another interesting result in Table 2 is that the tax rate on capital income has the largest (positive) effect on the actual state personal income tax base and gradually smaller (but still positive) effects on the calculated base and federal AGI. It is possible that this effect—and other positive effects of tax rates on the base, for that matter—might be picking up tastes for public services. Specifically, to the extent that more mobile taxpayers with higher incomes prefer

higher-tax-rate states under the assumption that those states provide more or better services, they might respond by relocating their entire tax bases into the high-tax state. Of course, those same taxpayers could then engage in tax planning to “move” their capital income out of that state. We also note that if we had been able to decompose our total tax base measures into such categories as labor and capital income, it is feasible that we could have found negative effects of specific tax rates on correspondingly specific tax bases.

On a similar note, the tax rate on pension income tends to increase the actual state base while reducing the calculated base and federal AGI. The first of these results is somewhat difficult to understand, but may be related to the fact that some states reported actual tax base data that included all of the non-resident income and not just the taxable portion. The latter results, however, might indicate that taxpayers with pension income prefer lower-tax-rate states and bring lower tax bases with them when they relocate.

Robustness Checks

The results in Column 1 of Table 1 might not be directly comparable to those in Columns 2 and 3 due to differences in sample size. To investigate the extent to which differences in samples drive the differences in the results, we re-estimated Columns 2 and 3 with the same sample of 175 state-years that were used in Column 1. If the results from these smaller-sample specifications align more closely with our baseline results in Column 1 of Table 1, we can attribute the differences between Column 1 and Columns 2 and 3 to the differences in the samples used. Alternatively, if the new results align more closely with those in Columns 2 and 3 of Table 2, we can attribute the differences to differences in the tax base measures used.

Interestingly, the results from this experiment were not uniformly more similar to any of the baseline models in Table 1. This suggests that both sample composition and tax base

definition contribute to the differences across the models. That said, the results from this check appear to be somewhat more aligned with those in Columns 2 and 3 of Table 1, suggesting that most of the differences are due to base definitions rather than sample composition.¹³ This finding also suggests that the results in Column 1 of Table 1 are perhaps less susceptible to concerns of sample selection bias that might have been expected.

We performed two additional checks in order to gauge the sensitivity of our results to matters of specification. First, we re-estimated the models in Columns 1 and 3 of Table 1 after replacing the three marginal tax rates (on wage, capital, and pension income) with the top marginal personal income tax rate. We did not do this for the model in Column 2 since the calculated base for that model is tax collections divided by the top rate. The results of this exercise are provided in Appendix Table 2. For the state AGI model, results using the top rate are not very informative (only two variables are statistically significant). Results from the federal AGI model, including combined elasticities for out-migration, in-migration, and the capital income index, are broadly similar to those in Table 1.

Our second and final check on the specification involved a re-estimation of the models in Table 1 after excluding all interaction variables (including only the base effects of all variables). While we have reason to believe (and in some cases empirical results to demonstrate) that the included interactions are meaningful additions to the models, we are curious to know how the combined elasticities in Table 2 compare to elasticities from simpler specifications. Results from these more parsimonious models reveal estimated elasticities that are often quite different from those in Table 2, suggesting that the inclusion of the various interactions is worthwhile.

¹³ Full results of all regression models are available from the authors upon request.

Conclusions

We estimate panel regressions of state data for 1989 through 2006 to assess the effects of tax rates, tax structure characteristics, migration, and other controls on state personal income tax bases. Results generally indicate that state tax rates on wage income have no statistically significant impact on the actual tax base and only a small positive effect on the calculated base, but they have a larger effect on federal AGI. This suggests that individuals could be filing federal returns from higher-tax-rate states but are not necessarily reporting the same income to those states for state tax purposes.

We also find that the tax rate on capital income is positively associated with state personal income tax bases, and it has the largest effect on actual state base data and gradually smaller effects on the calculated base and federal AGI. This and other positive effects of tax rates on the base might be picking up tastes for public services, to the extent that more mobile higher-income taxpayers move their entire tax base to states with more or better services (and higher tax rates). Similarly, we find that the tax rate on pension income increases actual state base data while reducing the calculated base and federal AGI. While the first of these results may be related to the fact that some states reported actual tax base data that included all of the non-resident income and not just the taxable portion, the latter results might indicate that taxpayers with pension income prefer lower-tax-rate states and bring lower tax bases with them when they relocate.

It is important to note that, with the exception of tax rates on pension income, we find little to no evidence that higher state tax rates reduce personal income tax bases. While some of our results provide evidence of tax-induced base mobility, that mobility does not appear to be of the revenue-reducing variety that many states might have feared.

References

- Bruce, Donald, John Deskins, and William F. Fox. 2007. "On the Extent, Growth, and Efficiency Consequences of State Business Tax Planning," in *Taxing Corporate Income in the 21st Century*, A. Auerbach, J. Hines, and J. Slemrod, editors, Cambridge University Press.
- Bruce, Donald, William F. Fox, and Markland Tuttle. 2006. "Tax Base Elasticities: A Multistate Analysis of Long Run and Short Run Dynamics," *Southern Economic Journal*, October.
- Carroll, Robert and Michael Wasylenko. 1994. "Do State Business Climates Still Matter – An Evidence of Structural Change." *National Tax Journal* 47(1): 19-37.
- Feldstein, Martin. 1995. "Behavioral Response to Tax Rates: Evidence from the Tax Reform Act of 1986." *American Economic Review* 85(2): 170-174.
- Fox, William, Henry Herzog, and Alan Schlottman. 1989. "Metropolitan Fiscal Structure and Migration" *Journal of Regional Science* 29(4): 523-536.
- Giertz, Seth H. 2007. "The Elasticity of Taxable Income Over the 1980s and 1990s" *National Tax Journal*, 60(4): 743-768.
- Knapp, Thomas A, Nancy E. White, and David E. Clark. 2001. "A Nested Logit Approach to Household Mobility" *Journal of Regional Science* 41(1): 1-22.
- Long, James E. 1999. "The Impact of Marginal Tax Rates on Taxable Income: Evidence from State Income Tax Differentials." *Southern Economic Journal* 65(4): 855-869.
- Saez, Emmanuel. 2003. "Reported Incomes and Marginal Tax Rates: 1960-2000," in *Tax Policy and the Economy*, 18, 117-174.
- Slemrod, Joel. 1998. "Methodological Issues in Measuring and Interpreting Taxable Income Elasticities," *National Tax Journal*, 51(4): 773-788.
- Wasylenko, Michael and Therese McGuire. 1985. "Jobs and Taxes: The Effect of Business Climate on States Employment Growth Rates." *National Tax Journal* 38(4): 497-511.
- Wasylenko, Michael. 1997. "Taxation and Economic Development: The State of the Economics Literature." *New England Economic Review* March/April, 37-42.

Table 1: Baseline Fixed Effects Regression Estimates

	State AGI	Calculated Base	Federal AGI
Tax rate on wage income	-1.571 2.959	1.161 0.996	1.331*** 0.289
Tax rate on capital income	16.798** 5.725	2.944*** 0.852	1.275*** 0.247
Tax rate on pension income	-1.186 1.720	-2.284*** 0.562	-0.794*** 0.163
Out-migration (lagged one year)	8.176** 3.026	-0.166 1.194	-0.238 0.347
In-migration (lagged one year)	-6.551* 3.449	-0.248 1.155	0.850* 0.336
Out-migration*Tax rate on wage income	-0.347 0.636	-0.172 0.131	-0.069* 0.038
In-migration*Tax rate on wage income	0.531 0.669	0.060 0.137	-0.055 0.040
Out-migration* Tax rate on capital income	-0.137 0.734	0.007 0.123	-0.048 0.036
In-migration* Tax rate on capital income	-0.183 0.735	-0.187 0.129	0.010 0.037
Out-migration*Tax rate on pension income	0.383* 0.165	0.109 0.082	0.069** 0.024
In-migration*Tax rate on pension income	-0.271* 0.128	0.108 0.086	0.007 0.025
Capital income index	10.044** 3.648	0.189 0.998	1.015*** 0.290
Capital income index* Tax rate on capital income	-2.885** 1.071	-0.232** 0.083	-0.198*** 0.024
Capital income index*In-migration	1.347* 0.708	0.045 0.245	-0.135* 0.071
Capital income index*Out-migration	-1.741** 0.642	-0.027 0.258	0.073 0.075
Top corporate income tax rate	0.120 0.083	-0.067* 0.036	-0.010 0.011
Reciprocity	-0.164 0.724	-0.148 0.159	0.161*** 0.046
Reciprocity*Tax rate on wage income	-0.199 0.191	0.156* 0.084	-0.088*** 0.024
GSP	0.890*** 0.211	1.056*** 0.070	0.617*** 0.020
Chang in starting point	-0.146** 0.051	-0.025 0.057	-0.008 0.017
Unemployment rate	0.059 0.056	-0.088** 0.027	-0.035*** 0.008
Democratic majority in Senate (dummy)	0.003 0.019	0.017 0.012	0.005 0.003
Democratic majority in House (dummy)	0.039 0.029	-0.005 0.012	-0.005 0.003
No state personal income tax (dummy)		0.049 0.129	0.052 0.038
Constant	-42.623* 19.432	0.493 5.126	1.241 1.489
N	175	900	900
R-squared	0.944	0.922	0.991

Notes: Entries are regression coefficients followed by standard errors in smaller font. All models also include fixed effects for state and year. Legend: * p<.1; ** p<.01; *** p<.001.

Table 2: Selected Combined Elasticity Estimates from Baseline Models

Elasticity with respect to:	State AGI		Calculated Base		Federal AGI	
	Mean	Max	Mean	Max	Mean	Max
Tax rate on wage income			0.091	0.531	0.521	0.157
Tax rate on capital income	3.415	2.904	1.874	1.772	0.362	0.275
Tax rate on pension income	1.252	1.481	-2.284	-2.284	-0.035	0.081
Out-migration	0.701	0.588			-0.018	-0.002
In-migration	-0.728	-0.628			0.227	0.168
Capital income index	0.441	-1.585	-0.363	-0.549	-0.782	-1.159
Reciprocity			0.240	0.342	0.026	-0.032

Notes: Mean elasticities are calculated using the mean values of all interacted variables. Max elasticities use the maximum values of interacted values, but are not necessarily the maximum elasticities.

Appendix Table 1: Summary Statistics

Variables	Definition	Data Resources	Units	Mean	Min	Max
State AGI	Actual state AGI	Provided directly by individual states	\$ Million	115283.70	6413.09	622244.00
Calculated Base	State calculated base	US Census Bureau; IRS	\$ Million	64157.42	853.55	550750.80
Federal AGI	Federal definition of tax base	IRS	\$ Million	102215.30	5220.42	1035152.00
Out-migration	State migration outflows	IRS	1 person	59541.48	8614.00	320472.00
In-migration	State migration inflows	IRS	1 person	61076.72	8253.00	306069.00
Tax rate on wage income	Average marginal state income tax rate on wage income	http://www.nber.org/~taxsim/state-marginal/	percentage point	4.65	0.00	8.95
Tax rate on capital income	Average marginal state income tax rate on capital income	http://www.nber.org/~taxsim/state-marginal/ ; IRS	percentage point	4.77	0.00	10.66
Tax rate on pension income	Average marginal state income tax rate on pension income	http://www.nber.org/~taxsim/state-marginal/	percentage point	3.61	-0.46	8.65
Capital Income Index	Index of Dividends, interest, and rents as share of personal income	Bureau of Economic Analysis	percentage point	100.81	58.89	156.30
Top corporate income tax rate	State top marginal corporate income tax rate	OTPR, Tax Policy Center	percentage point	6.80	0.00	12.00
Top personal income tax rate	State top marginal individual income tax rate	State Tax Handbook, Tax Policy Center	percentage point	5.79	0.00	14.00
Reciprocity	State average reciprocity index	Jon Rork, BEA	percentage point	1.80	0.00	29.98
GSP	State gross domestic product	Bureau of Economic Analysis	\$ Million	171668.10	10702.00	1742172.00
Change in starting point	Dummy variable if state PIT starting point changes to federal taxable income	Federation of Tax Administrators; The Book of the States	dummy	0.003	0	1
Unemployment rate	State unemployment rate	Bureau of Labor Statistics	percentage point	5.16	2.20	11.30
Democratic majority in Senate	Democratic dominance in the Senate	Statistical Abstract of the United States	dummy	0.50	0	1
Democratic majority in House	Democratic dominance in the House	Statistical Abstract of the United States	dummy	0.55	0	1

Appendix Table 2: Regression Results using the Top PIT Rate

	State AGI	Federal AGI
Top personal income tax rate	0.020 5.272	1.452*** 0.144
Out-migration lagged one year	4.667 2.890	-0.359 0.342
In-migration lagged one year	-2.723 3.277	0.970** 0.332
Top personal income tax rate*Out-migration	-0.453 0.310	-0.038** 0.013
Top personal income tax rate*In-migration	0.371 0.320	-0.032* 0.013
Capital income index	4.359 4.508	1.010*** 0.296
Capital income index*Top PIT	0.260 0.996	-0.161*** 0.020
Capital income index*In-migration	0.406 0.758	-0.161* 0.071
Capital income index*Out-migration	-0.852 0.676	0.097 0.075
Top corporate income tax rate	-0.018 0.084	-0.011 0.011
Reciprocity	0.480 0.458	0.011 0.029
Reciprocity*Top personal income tax rate	-0.070 0.110	0.005 0.012
GSP	1.211*** 0.191	0.617*** 0.021
Chang in starting point	-0.171*** 0.049	-0.010 0.017
Unemployment rate	-0.001 0.049	-0.030*** 0.008
Democratic majority in Senate (dummy)	0.001 0.018	0.007* 0.003
Democratic majority in House (dummy)	-0.005 0.027	-0.006* 0.003
No state personal income tax (dummy)		-0.095** 0.030
Constant	-25.688 23.186	1.421 1.505
N	175	900
R-squared	0.945	0.990

Notes: Entries are regression coefficients followed by standard errors in smaller font. All models also include fixed effects for state and year. Legend: * p<.1; ** p<.01; *** p<.001.