# USEFUL DATA MAY BE RIGHT UNDER YOUR NOSE: ESTIMATING THE ELASTICITY OF TAXABLE INCOME WITH LOCAL OPTION INCOME TAX DATA

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## INTRODUCTION

THIS STUDY ESTIMATES THE TAX RATE ELASTICITY of Indiana taxable income by employing annual county-level income tax data spanning from 1996 to 2006. Currently, 18 states allow some form of local income or payroll taxes. These local option tax regimes potentially create tax rate and tax base variation on a county- or municipal-level that could be the grist for cross-sectional or panel regression studies to estimate the rate elasticity of taxable income. While a number of studies have investigated the effect of taxes on income generation at the national level, less research has been undertaken to assess the tax rate elasticity of taxable income at the state level. A few state panel data studies have been conducted in recent years to estimate tax rate elasticities for state tax systems, including state income taxes. Nevertheless, state case studies like this one could augment the current literature and allow researchers to "triangulate" with different methods and different data around a narrow range of elasticity estimates.

## INDIANA'S COUNTY INCOME TAXES

Indiana's county income tax regime from 1996 to 2006 was comprised of three optional income taxes, each of which could be used to fund varying government purposes. Counties could choose between imposing either: (1) the county adjusted gross income tax (CAGIT), or (2) the county option income tax (COIT). Regardless of whether a county imposed CAGIT or COIT, it could also impose a separate tax called the county economic development income tax (CEDIT). Counties also could simply impose CEDIT without imposing either CAGIT or COIT.

Each tax is imposed on county residents, however, nonresidents who work or maintain a business in a CAGIT, COIT, or CEDIT county are subject to the tax (at a reduced rate) if the individual's county of residence does not impose one of the taxes. Each county income tax is piggybacked on the state income tax system, utilizing a standard tax base (the taxpayer's Indiana taxable income) but allowing tax rates to be varied at the discretion of each county up to specified maximums. From 1996 to 2006, the maximum allowable tax rate for CAGIT and COIT was 1 percent and for CEDIT the maximum allowable tax rate was 0.5 percent. In counties imposing CAGIT *and* CEDIT the maximum allowable combined tax rate was 1.25 percent and in counties imposing COIT *and* CEDIT the maximum allowable combined tax rate was 1 percent. Nevertheless, special maximum rate exceptions have also been enacted for select counties. So tax rates, in some cases, could exceed 1.25 percent during this period.

The county option tax system has resulted in variation over time in terms of the counties adopting the different taxes and in terms of the tax rates imposed by the counties. In 1996, 84 out of 92 counties imposed at least one of the county income taxes. By 2006, the number of counties imposing a tax had increased to 89. In 2006 alone, 56 counties imposed CAGIT, 28 counties imposed COIT, and 74 counties imposed CEDIT. What's more, the average county tax rate increased from about 0.9 percent to about 1.1 percent from 1996 to 2006, with the standard deviation hovering around 0.4 percent.

## PERTINENT LITERATURE

Theory suggests that income tax rate increases can encourage individual taxpayers to alter their behavior in various ways in order to reduce their taxable income. Feldstein (1995) provides a rather comprehensive discussion of how income tax rate changes may affect taxpayer behavior and alter taxable income. Traditionally, the focus has been on the extent that tax rate increases discourage income earning activity where, for instance, people reduce their labor market participation as income taxes take an increasing percentage of their wages and salaries. However, tax rate increases also could encourage tax avoidance behavior through increased use of exemptions and deductions and various other tax planning strategies. Finally, and probably least likely, local level tax rate increases

could be avoided through migration to lower tax locations.

Over the last 15 or so years, a number of studies have utilized cross sections and panels of federal income tax return data to assess the effects of federal tax rate changes on taxable income. These studies estimate a net-of-tax elasticity measuring the change in a taxpayer's taxable income due to changes in the taxpayer's net-of-tax rate. The net-of-tax rate is the percentage of before-tax income that the taxpayer retains after taxes. Feldstein (1995) and Auten and Carroll (1999) estimated the effects of the federal tax reforms enacted in 1986, Saez (2003) estimated the effect of bracket creep in the late 1970s and early 1980s, and Gruber and Saez (2002) estimated the effects of all tax reforms implemented during the 1980s. These studies generated a broad array of net-of-tax elasticity estimates, ranging from 0.2 to 0.4 (Saez, 2003) and 0.4 to 0.5 (Gruber and Saez, 2002) on the low end to 0.5 to 1.1 (Auten and Carroll, 1999) and 1.0 to 3.0 (Feldstein, 1995) on the high end.

In contrast to the studies centering on the effects of federal tax policy changes, Long (1999) shifted the focus to income tax rate variation arising across states. Long employed a cross section of federal income tax returns for 1991 comprising individual taxpayers from different states. Long computed a state marginal income tax rate for each taxpayer in the panel. He then used the taxable income and tax rate variation to estimate the net-of-tax elasticity and the tax rate elasticity – the tax rate elasticity being the change in taxable income resulting in a given change in the income tax rate. The net-of-tax elasticity estimates range from 0.19 to 0.82 based on a weighted average relative to the returns in the data set and 0.37 to 0.8 when the weighted average is based on income in the data set. These values are very similar in magnitude to the estimates by Saez (2003) and Gruber and Saez (2002). More relevant to this study, however, Long (1999) generates tax rate elasticity estimates ranging from -0.07 to -0.24 based on the return weighted average and -0.16 to -0.29 based on the income weighted average.

More recently, Bruce, Deskins, and Fox (2007) and Deskins (2009) employed state-level panel data spanning 1985 to 2003 to estimate the rate elasticity of taxable income for state income tax systems. Both studies specified fixed-effects regression models of state taxable income on the state income tax rate and population. While population was used as a control for scale differences between the states, the models also included both state and year fixed-effects variables. In both studies, state taxable income was imputed using annual state income tax revenue totals from the U. S. Census Bureau's *State Government Finances* database and state income tax rate data from Commerce Clearing House's *State Tax Handbook*. Bruce, Deskins, and Fox (2007) provide contrasting estimates of the rate elasticity based on the top marginal tax rate employed by states versus state average effective tax rates estimated by (1) NBER's *TAXSIM* program, and (2) the District of Columbia in its annual *Tax Rates and Tax Burdens* study. Deskins (2009) investigated the effect of the top marginal tax rate and extended the research by examining the potential that the rate elasticity has changed over time.

Elasticity estimates by Bruce, Deskins, and Fox (2007) suggest that taxpayers are much more responsive to changes in the top marginal income tax rate. The estimated elasticity on the top marginal tax rate is -0.75 while the TAXSIM effective tax rate elicits a much lower elasticity of -0.17. The District of Columbia effective tax rates failed to result in statistically significant elasticity estimates. Deskins (2009) confirms the results relating to the effect of top marginal rate changes, estimating an elasticity ranging from about -0.51 to about -0.66 at the mean top marginal tax rate. In addition, Deskins finds no evidence that the taxpayer response to marginal rate increases varied over time from 1985 to 2003.

The top marginal rate elasticity and the TAXSIM effective rate elasticity are important results and may provide an important distinction between the effects of graduated tax rate structures and flat rate taxes. Seven states currently have flat rate income taxes and a sizeable number of states have very compressed graduated rate structures where the top marginal rate applies at a relatively low-income level. As to the latter point, of the states with graduated rate structures, six have top marginal tax rates that apply when taxable income is $10,000 or under and five have top marginal tax rates that apply when taxable income is between $10,000 and $20,000. Presumably, the elasticity relating to the TAXSIM effective tax rate is more indicative of the base response to changes in a flat rate income tax or a graduated rate structure that is compressed.

The present study employs county-level panel data in a single state—Indiana—to estimate the relationship between the average taxable income in a county and the combined state and county

income tax rate imposed on county residents. This methodology is similar to that employed by Bruce, Deskins, and Fox (2007) and Deskins (2009), except that the unit of analysis is reduced from the state to the county level. In this case, sufficient variation in taxable income and combined state and county tax rates exists across counties in Indiana and over time. From a purely utilitarian perspective, the Indiana county-level panel permits us to investigate the elasticity of taxable income solely in Indiana and, possibly, to provide more customized estimates of the rate elasticity for Indiana policymakers. However, by focusing on one state, I eliminate substantial cross-sectional variation in state income tax policy which may not be sufficiently controlled by imputed tax rates and fixed effects—a problem highlighted previously by Reed and Rogers (1998, 2000). Since the county income tax in Indiana is piggybacked on the state income tax, the income tax policy variation at the county level is limited to tax rates.

The taxable income and tax rate data utilized in this study is computed from Indiana tax returns and aggregated to the county level. Consequently, the data is free of two types of measurement error that may be introduced in the state panel studies. The state panel data studies rely on state revenue totals reported in the U. S. Census Bureau's *State Government Finances* database. Taxable income is imputed using the Census Bureau's revenue data and the statutory income tax rate in each state. The statutory tax rate is simple to define for flat rate tax systems. However, for graduated tax rate structures the studies utilize the top marginal income tax rate from these states. This introduces measurement error because not all taxpayers pay the top marginal tax rate.

In addition, the amounts included in the Census Bureau's state revenue totals may be subject to reporting errors that aren't apparent to researchers using the data or the state revenue totals may be correct but misinterpreted by researchers unfamiliar with a particular state and that state's tax system. An example of such measurement error relates to Indiana's corporate income tax revenue between 1987 and 1990. At this time, Indiana imposed three corporate taxes, a gross income tax and two net income taxes. In each of these years, the Census Bureau's *State Government Finances* database underreported Indiana's corporate income tax revenue by an average of about 60 percent. This is because revenue from the gross income tax was instead reported under the general sales tax category. The Census Bureau over-reported Indiana's sales tax revenue during these years by an average of about 22 percent. The extent to which this type of measurement error is present in the revenue totals reported for other taxes or other states is unknown, however, the potential certainly exists.

Another example of how measurement error may be introduced when using data from the *State Government Finances* database relates to state lottery revenue. The Census Bureau does not distinguish between traditional lottery ticket revenue and revenue generated by video lottery terminals. Consequently, the lottery revenue totals reported by the Census Bureau for Delaware, Rhode Island, and West Virginia (three state lotteries that operate traditional ticket games and also operate video lottery terminals) can be misinterpreted if a researcher is studying only revenue derived from ticket sales and does not know that video lottery revenue is included in these revenue totals. For instance, West Virginia lottery *ticket* sales for FY 2003 are reported at $556.3 million by the Census Bureau. However, the West Virginia Lottery's FY 2003 annual report indicates that ticket sales totaled only $192.1 million. It appears that the ticket sales total reported by the Census Bureau includes $298.8 million in net revenue from video lottery terminals at pari-mutuel horse racetracks and $66.2 million in net revenue from video lottery terminals in taverns and clubs.[1]

Another potential issue with the state panel studies may be the effects of intermingling states that impose graduated tax rate structures, states imposing very compressed graduated tax rate structures, and states imposing flat rate taxes. The degree to which this may affect the rate elasticity estimate is illuminated by Bruce, Deskins, and Fox (2007). They estimate that the base response to changes in the top marginal tax rate of a graduated tax rate structure are 4.5 times larger than the base response to average effective tax rate changes.

## ESTIMATION PROCEDURE

To test the relationship between taxable income and income tax rate and estimate the rate elasticity of taxable income, I estimate the following equation:

$$LN(TI) = a + \beta_t LN(t) + \beta_X X,$$

where ***TI*** is the Indiana taxable income per filer by county (***Taxable Income***); ***t*** is the combined state

and county income tax rate by county (***County Tax Rate***); and ***X*** represents national, state, and county economic variables.

***Taxable Income*** is in real terms (base year = 1996) and is log transformed in the regression model. I control for scale differences between the counties by using the average taxable income per taxpayer in each county instead of the aggregate taxable income. ***County Tax Rate*** is the combined state and county income tax rate, which allows the variable to be log transformed even for counties that did not impose one of the county income taxes. As illustrated above, the county income tax rates have varied across counties and over time; however, the state income tax rate was fixed at 3.4 percent from 1996 to 2006. Since migration is reasonable on the local level, I specify the average tax rate for surrounding counties (***Surrounding County Tax Rate***) as a control. Likewise, this variable is log transformed in the regression equation. Table 1 presents summary statistics on the different variables used for the regression estimates.

I diverge from the methodology employed by Bruce, Deskins, and Fox (2007) and Deskins (2009) by not specifying cross-sectional fixed effects. Instead I specify county-level variables to control for county socioeconomic variation.[2] One of the county-level variables is the county annual average unemployment rate (***County Unemployment Rate***) which is not fixed over time. The remaining county-level variables are fixed over time at 2000 values. These variables are the county percentage of employment in the manufacturing sector (***Pct. Manufacturing Employment***); county percentage of population who are high school graduates (***Pct. High School Graduates***); county percentage of population who are college graduates (***Pct. College Graduates***); and county percentage urban population (***Pct. Urban Population***). I specify a trend variable (***Trend***) to account for the effects of state and national economic trends not captured by ***County Unemployment Rate***. I also specify a dummy variable equal to one if a county is a border county (***Border County***) to account for any systematic differences that may be present between border and interior counties.

*Table 1*
**Summary Statistics**

| | *Full Sample* | | *1996* | | *2006* | |
|---|---|---|---|---|---|---|
| *Variable* | *Mean* | *Std. Dev.* | *Mean* | *Std. Dev.* | *Mean* | *Std. Dev.* |
| Real County Taxable Income Per Taxpayer[1] | 31,651.00 | 6,669.15 | 30,812.54 | 7,578.42 | 32,654.00 | 7,224.36 |
| County Tax Rate[1] | 4.40 | 0.37 | 4.31 | 0.38 | 4.53 | 0.35 |
| Surrounding County Tax Rate[1] | 4.41 | 0.21 | 4.33 | 0.21 | 4.55 | 0.20 |
| County Unemployment Rate[2] | 4.46 | 1.44 | 4.35 | 1.53 | 5.12 | 0.92 |
| Pct. Urban Population[3, 4] | 45.19 | 25.73 | | | | |
| Pct. College Graduates[3, 4] | 14.56 | 6.62 | | | | |
| Pct. High School Graduates[3, 4] | 80.64 | 4.81 | | | | |
| Pct. Manufacturing Employment[3, 4] | 21.76 | 9.72 | | | | |
| Border County[5] | 0.38 | 0.49 | | | | |

[1] Tax return data aggregated by county obtained from the annual *Greenbar Report* prepared by the Indiana Department of State Revenue for tax years 1996-2006. The *Greenbar Report* is available upon request of the Commissioner's Office.

[2] U.S. Department of Labor.

[3] U.S. Census Bureau P5. Urban and Rural-Universe: Total Population; P37. Sex by Educational Attainment for the Population 25 Years and Over-Universe: Population 25 Years and Over; P49. Sex by Industry for the Employed Civilian Population 16 Years and Over-Universe: Employed Civilian Population 16 Years and Over.

[4] Variables are fixed at 2000 values.

[5] Binary dummy variable =1 if county is a border county.

*Table 2*
**Regression Estimates**

| *Variable* | *Model 1* | *Model 2* | *Model 3* |
|---|---|---|---|
| Constant | 10.29586*** | 10.69416*** | 10.38815*** |
| | *(0.138848)* | *(0.1222861)* | *(0.0993096)* |
| LN(County Tax Rate) | -0.355482*** | -0.4435664*** | -0.1852972*** |
| | *(0.0585605)* | *(0.0471258)* | *(0.0423223)* |
| LN(Surrounding County Tax Rate) | 0.3627566*** | 0.4576621*** | 0.298374*** |
| | *(0.1034238)* | *(0.0942397)* | *(0.0702624)* |
| Trend | 0.0060667** | 0.013429*** | 0.0120635*** |
| | *(0.0027259)* | *(0.002214)* | *(0.0020062)* |
| County Unemployment Rate | | -0.0957392*** | -0.085021*** |
| | | *(0.005782)* | *(0.0048654)* |
| Pct. Urban Population | | | 0.0026089*** |
| | | | *(0.000138)* |
| Adjusted R-Square | 0.0383*** | 0.3994*** | 0.5332*** |

| *Variable* | *Model 4* | *Model 5* | *Model 6* |
|---|---|---|---|
| Constant | 9.85378*** | 9.92423*** | 9.981991*** |
| | *(0.0921401)* | *(0.0937152)* | *(0.0947495)* |
| LN(County Tax Rate) | -0.0611497* | -0.0821245** | -0.0970306*** |
| | *(0.0330559)* | *(0.0337294)* | *(0.0335334)* |
| LN(Surrounding County Tax Rate) | 0.0820477 | 0.048256 | 0.0304706 |
| | *(0.0558869)* | *(0.0564102)* | *(0.0577852)* |
| Trend | 0.0094832*** | 0.0097851*** | 0.0099469*** |
| | *(0.0015869)* | *(0.0016326)* | *(0.0016286)* |
| County Unemployment Rate | -0.0459742*** | -0.0449917*** | -0.0449137*** |
| | *(0.0031785)* | *(0.0033953)* | *(0.0033987)* |
| Pct. Urban Population | 0.0005633*** | 0.0003842** | 0.0003603** |
| | *(0.0001394)* | *(0.0001648)* | *(0.0001693)* |
| Pct. College Graduates | 0.0132452*** | 0.0141118*** | 0.0141483*** |
| | *(0.0014905)* | *(0.0015989)* | *(0.0016115)* |
| Pct. High School Graduates | 0.004994*** | 0.0047666*** | 0.0046828*** |
| | *(0.0008928)* | *(0.0008716)* | *(0.0008901)* |
| Pct. Manufacturing Employment | | 0.0008732*** | 0.0008754*** |
| | | *(0.0002992)* | *(0.0002999)* |
| Border County | | | -0.0087395 |
| | | | *(0.0057035)* |
| Adjusted R-Square | 0.7191*** | 0.7136*** | 0.7141*** |

Observations = 1,012.

LN(*) denotes the natural log of the variable.

Dependent Variable = LN(Real County Taxable Income Per Taxpayer)

All dollar amounts are real dollars (base year = 1996) and all percentages are measured on a 0 - 100 scale.

All entries are OLS regression coefficients with robust standard errors in parentheses. All regression models include year fixed effects.

*.05<p<=.10; **.01<p<=.05; ***p<=.01

## REGRESSION RESULTS

Coefficient estimates for six model specifications are reported below in Table 2.[3] The result of the model building process is specified primarily in Model 4, Model 5, and Model 6. These models fit the data relatively well, registering an R-squared of approximately 0.72. All of the variables except for ***Surrounding County Tax Rate*** are statistically significant at the 10 percent level or better in these three models. The county controls are statistically significant at better than the 1 percent level in Model 4, Model 5, and Model 6. The coefficients on the county controls are robust, being statistically significant, exhibiting the expected sign, and exhibiting similar values across the model specifications. These estimates suggest that the average taxable income is decreasing in the unemployment rate, and increasing in urban population, educational attainment, and manufacturing employment.

The estimates in Model 4, Model 5, and Model 6 suggest that taxable income is relatively unresponsive to changes in the income tax rate. The coefficient estimates on ***County Tax Rate*** suggest that a 10% increase in the tax rate (based on the panel average an increase from 4.4 percent to 4.85 percent) leads to a decline in taxable income of roughly 0.6 percent to 1.0 percent. These elasticity estimates are similar to those obtained by Bruce, Deskins, and Fox (2007) on the TAXSIM average effective tax rate, but are below almost all elasticity estimates derived by Long (1999). Interestingly, while the coefficients on ***Surrounding County Tax Rate*** are positive, they are not statistically significant. Thus, there is no statistical evidence that taxable incomes in a county are driven up by higher tax rates in surrounding counties – potentially suggesting some type of migration away from higher taxing counties.

The results appear to confirm the earlier observation that studies estimating the base response to changes in top marginal tax rates may severely overestimate the impact of rate changes in flat rate tax systems. The rather low elasticity values also may indicate that there are relatively few ways for wage and salary earners to respond to tax rate increases by reducing their state taxable income via either state exemptions and deductions or exclusions or adjustments to federal gross income (in states that start the tax computation with federal adjusted gross income). What's more, it appears that surrounding county tax rates have no impact on a county's taxable income, suggesting that taxpayers are not using migration between counties (at least at a discernible level) as a response to higher tax rates. Potentially, the lack of response by taxpayers could be due to counties actually converging, albeit on different time schedules, toward very similar maximum tax rates. The summary statistics may tell the story, where the average county tax rate increased by about two tenths of a percentage point from 1996 to 2006, but the standard deviation declined slightly.

## CONCLUSION

In this study I estimate the rate elasticity of Indiana taxable income by employing annual county-level income tax data in Indiana from 1996 to 2006. The panel eliminates the need that has arisen in other studies to control for variation in income tax systems because the county taxes in Indiana are piggybacked on the state income tax. Thus, the only income tax policy variation centers on county tax rates. The taxable income and tax rate variables are computed from tax return data aggregated to the county level. I control for scale differences between the counties by using the average taxable income per taxpayer in each county and I employ various controls for county socioeconomic differences. The preferred regression models explain about 72 percent of the variation in county average taxable income and generate statistically significant estimates of the rate elasticity of taxable income ranging from -0.06 to -0.1.

As with any initial research, there are additional models that need to be specified and estimated and improvements to the current models that need to be investigated. Future estimating models should interact the trend variable and the tax rate variables, both for the county and the surrounding counties. The results could indicate whether the rate elasticity tends to change over time as more counties adopt county taxes and the tax rates increase in all counties. Such variation over time may indicate changes in taxpayer's ability or willingness to utilize exemptions, deductions, and other tax planning devices to lower taxable income as well as simply migrating away from areas where tax rates are highest. Future research should also investigate the impact of the county property tax burden on taxable income and the income tax rate. Since the county income tax is, in part, aimed at property tax relief, the property tax burden in counties may influence taxable income through the income tax rate. Thus,

the tax rate variable may be endogenous. However, the effect of the property tax burden on taxable income is more complicated because the Indiana income tax includes a deduction for a homeowner's property taxes. Thus, property taxes also directly influence taxable income.

Finally, this case study serves as a model for research that could be pursued utilizing local income tax data in various states to again estimate the rate elasticity of the income tax base. Assuming that sufficient local communities in a state (counties, municipalities, school districts, et al.) have adopted the local tax and that the rate can be adopted at varying levels, similar panel studies could be undertaken in these states.

## Notes

[1] Totals from West Virginia Lottery Comprehensive Financial Report for the fiscal year ended June 30, 2003.

[2] Bruce, Deskins, and Fox (2007) and Deskins (2009) control for cross-sectional variation in their state panel studies by specifying state fixed effects.

[3] Wooldridge's (2002) test for autocorrelation in panel data models suggests the presence of an AR(1) error structure. Consequently, autocorrelation robust standard errors are employed for hypothesis tests.

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