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Revenue Implications of Alternative Personal Income Tax Structures in Illinois

Executive Summary

This report provides background information and evidence-based answers in response to questions posed by an Illinois legislator. The questions are: (1) Can you describe the income distribution in Illinois and how this has evolved over the recent past? (2) Can you project out the income distribution in Illinois for the next five years and project personal income tax revenue with: (a) Illinois' current personal income tax system? (b) a graduated rate personal income tax system comparable to other Midwestern states (i.e. Wisconsin, Minnesota, Iowa or Missouri)? (3) What personal income tax revenue would Illinois' economy generate if it adopted the personal income tax structure of Wisconsin, Minnesota, Iowa or Missouri? (4) How are tax burdens distributed in the current tax system and how would they be different under alternative tax systems in the question above?

In order to answer questions (1) and (2) our report provides an analysis of the current and historical income distributions of Illinois taxpayers along with forecasts of how the income distribution will change over the next five years. There is a concern among some legislators that an increase in income inequality will have a negative impact on the Illinois tax system. We first reviewed the historical evolution in the Illinois income distribution using data from the Internal Revenue Service, and from peer-reviewed academic research using the same data source. We demonstrate that since the late 1970s, income inequality has been rising in Illinois and that the increase has mirrored the increase at the national level. We then use standard economic forecasting techniques to forecast the share of income received by households in the top and bottom income categories.

We find that households in the top income category are expected to receive a greater share of income over the next five years but that the pace of the increase will be smaller than in recent history. Eventually, the share is projected to peak and start coming down. At the bottom end of the income distribution, the share of income is predicted to continue to fall but at a slower pace than in the past, reach a trough and eventually begin to go up. Overall, this suggests that the changes in the income distribution on average over the next five years are not expected to be great, implying very little effect on the Illinois tax system.

The next section of the report provides

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background information about the relationship between state personal income tax systems and the revenue they generate. Tax revenue is determined by the product of the tax rate and the tax base. Tax rates are determined by government legislation, while the tax base depends upon both government rules about what is included and the value of economic transactions or aggregates. For the individual income tax, the tax base is broadly defined as revenue realized by households and small businesses less any income that is exempted from taxation by law. A key concept in modeling the revenue that will be received from any change in tax rates is the responsiveness of the tax base, which economists call elasticity. There is a large body of scholarly work that measures the extent to which households change their behavior in response to changes in tax policies. The elasticity of taxable income (ETI) is a key measure of the magnitude that the tax base will change in response to changes in tax rates. Illinois' recent experience and some more rigorous research provides evidence that previous increases in Illinois' tax rates greatly increased its revenue and have resulted in some reductions in its tax base, at least in the short run. However, the evidence also suggests that tax base reductions were not large. There is also some evidence in the literature that suggests particular classes of taxpayers, particularly high income, highly educated and highly mobile taxpayers may be more likely to change their behavior in response to tax rate increases than others. Therefore, we produce a "base" set of estimates of revenue generated by the Illinois system, the distribution of tax burdens by income category, and the revenue and tax burdens of the comparison states using an assumption of zero responsiveness of the tax base.

We also generate estimates using assumptions of tax base responsiveness suggested by the upper range of estimates cited in the academic literature. One can think of these as reasonable upper and lower bounds of what would happen in the hypothetical scenario of changing Illinois' tax rates.

We used standard tax-policy analysis methodologies to develop these estimates. We gathered the best available survey data about Illinois residents and adjusted it to more closely represent the income distribution of Illinois' resident tax filers in 2016 (the most recent survey data available). We ran this adjusted data through a well-known and widely-used tax calculator (Taxsim27), housed at the National Bureau of Economic Research (NBER), to calculate total tax revenue and the distribution of tax burdens in Illinois and comparison states.

Tables 3a and 3b summarize our initial findings, which do not include taxpayer responsiveness to changes in tax policy. Table 3a shows that the personal income tax systems of Illinois and each of the comparison states are progressive in the sense that, after accounting for deductions, exemptions and credits, median effective tax rates rise with income. Illinois is less progressive than comparison states because its effective tax rate on the lowest income group is higher than comparison states and its effective tax rate on the highest income groups are lower than comparison states.

Estimates in Table 3b show that Wisconsin, Minnesota and Iowa's tax systems all would generate significantly more total revenue than Illinois' given the same set of tax filers, while Missouri's tax system generates slightly less revenue than the Illinois system. Illinois generates more revenue from the lowest income group (less than $25,000) than Wisconsin or Minnesota but less than Iowa and about the same amount as Missouri. All four states generate more revenue than Illinois from tax filers in the highest income category.

We ran two other analyses that estimate what will happen if tax filers change their behavior in response to changes in the tax system. Both analyses build on the research regarding prior tax rate changes in Illinois. That prior research indicated a substantial responsiveness of the tax base, particularly in higher income categories.

We programmed these results into our analyses and report results in Tables 4 and 5. We find that allowing for these behavioral changes does not substantially alter our basic conclusions.

Illinois' tax system raises less revenue than the tax systems of comparison states, except that Missouri and Illinois impose a smaller tax burden on the top income group than any of the other comparison states. The results are more mixed at the bottom of the income distribution with Illinois imposing a higher tax burden than Wisconsin or Minnesota but a lower tax burden than Iowa or Missouri.

List of Figures and Tables

Genesis of this report: Four key questions

As part of its continuing effort to serve the state, the University of Illinois restructured its system-wide Institute of Government and Public Affairs (IGPA) to better integrate the work of faculty from across the system and to enhance its capacity to accomplish its mission of improving public policy discussion through non-partisan, evidence-based research and public engagement. As part of this restructuring, IGPA is inviting legislative and other public policy leaders' suggestions about the most relevant, appropriate and timely research topics.

As a result of this process, Illinois State Senator Andy Manar began a dialogue with IGPA researchers regarding issues related to Illinois' personal income tax system. After discussion, Senator Manar and the lead researchers agreed that it would be valuable for IGPA to conduct research to answer the questions in Box 1 below.

We stress that, although the questions were developed in conjunction with Senator Manar, he played no further part in the research design, data gathering, analysis or writing of this report. This report represents the non-partisan, evidence-based analyses of experienced and independent scholars. The findings reported here are solely the responsibility of the authors.

Questions posed by Senator Manar

1. Can you describe the income distribution in Illinois and how this has evolved over the recent past?
2. Can you project out the income distribution in Illinois for the next 5 years and project personal income tax revenue with:
    a. Illinois' current personal income tax system?
    b. A graduated-rate personal income tax system comparable to other Midwest states (e.g. Wisconsin, Minnesota, Iowa or Missouri?
3. What personal income tax revenue would Illinois ' economy generate if it adopted the personal income tax structure of Wisconsin, Minnesota, Iowa or Missouri?
4. How are tax burdens distributed in the current tax system and how would they be different under alternative tax systems in #3 above?

Evolution of Illinois' income distribution

Answering Question 1

Characterizing income distributions and measuring inequality is an important topic for understanding the dynamics of the economy and the relative distribution of rewards that come from economic activity. Concerns over increasing income inequality and the effects of that increase on society have permeated the media and political discussion.

In order to answer the question about the income distribution in Illinois and its evolution over time, we used data from the economist Mark W. Frank[1].

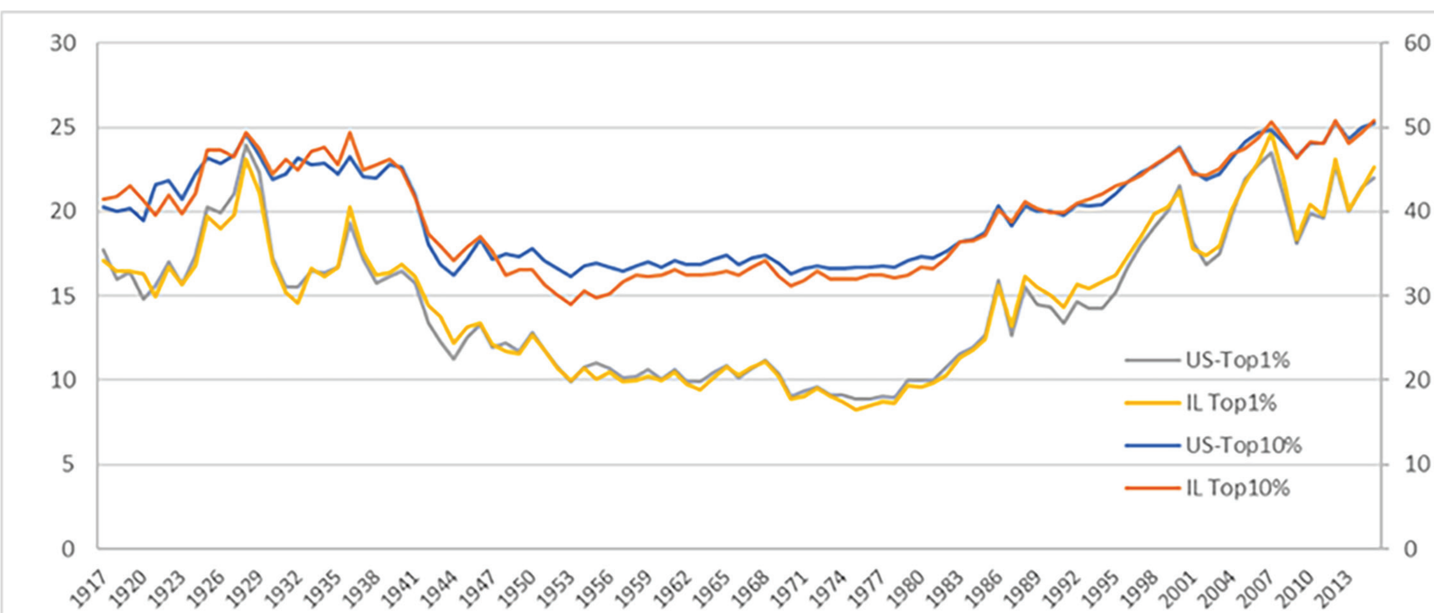
Figure 1, based on Frank's data, shows the long-term trend in the share of income received by the top 10 percent and top 1 percent of households for both the US as a whole and for the state of Illinois. These are two of the more commonly cited statistics used in describing inequality. The income concept used here is adjusted gross income (AGI), which is a broad measure of income and is a basic input to the federal and most state personal income tax systems.[2]

United States and Illinois patterns of inequality are parallel. Income inequality declined steadily from the late-1920s to the late-1970s and then began to rise. Also, the gap between the share of income derived by the top 1 percent and the top 10 percent widened during the earlier period (indicated by the top 1 percent lines falling by more relative to the top 10 percent lines). This suggests that the amount of income of the 9 percent of households between the 90th percentile of income (top 10 percent) and the 99th percentile (top 1 percent) increased. Then that gap narrowed again, indicating that that households in the top 1 percent of incomes took an increasing share, even compared to the next 9 percent.[3]

Figure 1 also suggests that the general pattern of inequality over time is very similar in Illinois and the nation as a whole. Illinois households in the top 10 percent of incomes did see a slightly greater fall in income shares during the immediate post-World War II period, but over time the differential has narrowed dramatically.

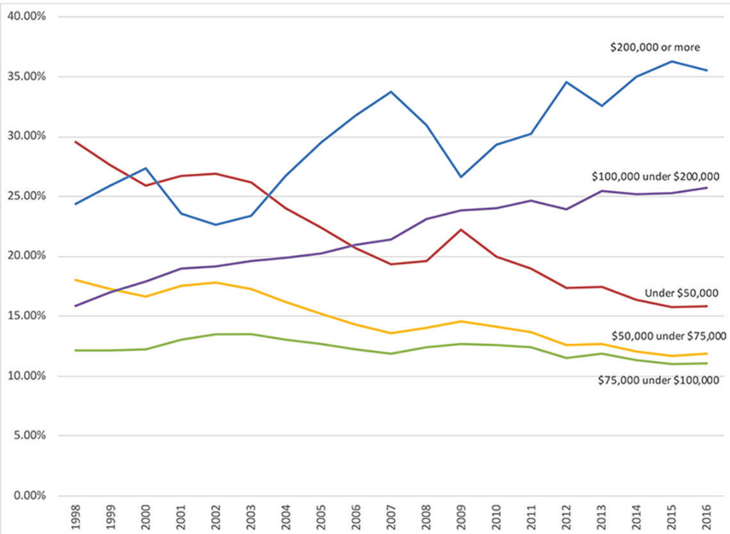
Frank's data is confined to the distribution of income among the top group of income earners, but the income distribution below the top 10 percent is also important. In order to explore this in more detail, we obtained recent summary IRS Statistics of Income (SOI) data for the period 1998 to 2016, which reports total income and the total number of tax returns filed at different levels of AGI. This allows us to construct a distribution of income shares received in each category of income. Figure 2 shows the results of the analysis for the last two decades.

Figure 1: Income shares of the top 10 percent and top 1 percent of incomes, 1917-2015



Note: Left axis is income share of Top 1 percent; Right axis is income share of top 10 percent. Source: Frank (2009) and author's calculations.

Figure 2: Distribution of income shares, IRS Statistics of Income Summary Data, 1998-2016



Source: Internal Revenue Service, Statistics of Income and author's calculations

The data suggest a similar story of increased inequality as seen in the Frank data. For tax filers with AGIs of more than $200,000 (the blue line), the income share rose from a low of just under 23 percent in 2002 to over 35 percent in 2016. The share of income received by the next group ($100,000-$200,000, the purple line) also increased, from 16 percent to just over 25 percent.

The income share for the middle income range (green line) remained virtually the same, falling by just 1 percent. The income shares received by the bottom two income categories both fell. For the $50,000-$75,000 AGI range (yellow line), the decline was from 18 percent of total incomes in 1996 to just under 12 percent in 2016.

The largest decline was for households with income below $50,000 per year (red line). In 1998, they received just under 30 percent of total household income, by 2016 this figure had been nearly halved, to just under 16 percent.

A commonly used summary measure of income inequality is the ratio of shares received by the top ($200,000 and more) and bottom (under $50,000) income categories. In 1998 this ratio was 0.83, indicating that the bottom income category actually received a greater share of income than the top category. By 2016 this ratio had climbed to 2.25.

Answering Question 2

In order to forecast inequality in Illinois incomes, we used data on the shares of income received in the top and bottom income categories from the SOI. We focused on these income categories because that is where the greatest recent changes have occurred and because this yields a forecast of the top-bottom ratio, which, as discussed above, is a widely used measure of income inequality.

We used standard modeling techniques to develop our forecasts. We used an "additive" forecasting approach, starting with naïve forecasting models and smooth the data over time to remove the "peaks and valleys" and better identify trends. We also used autoregressive models that include relationships between the most recent observations and the next most recent set of observations, essentially modeling how the data develops over time.

We then added explanatory variables, such as the unemployment rate and economic output (state GDP), to the model if they increased our ability to predict the income shares. The model development period (which forecasters call the "in-sample period") was 1998-2013. We assessed the predictive ability by creating a testing period of actual data (our "pseudo-out-of-sample period") of 2014-2016.

For the less than $50,000 income category, the best fitting model is a second order autoregressive model (AR2 – where the contemporaneous value of the variable is regressed, i.e. statistically correlated) on the most recent prior value and the second most recent prior value.

We included the state unemployment rate as a predictor variable. Other variables that we considered produced larger testing period errors. Figure 3 shows the actual value of the income share in this income category over time (red line), and the predicted value of that share (blue), along with the 90 percent prediction interval (gray "cone" around the forecast value), which means that 90 percent of outcomes for the future are expected to fall within this range.

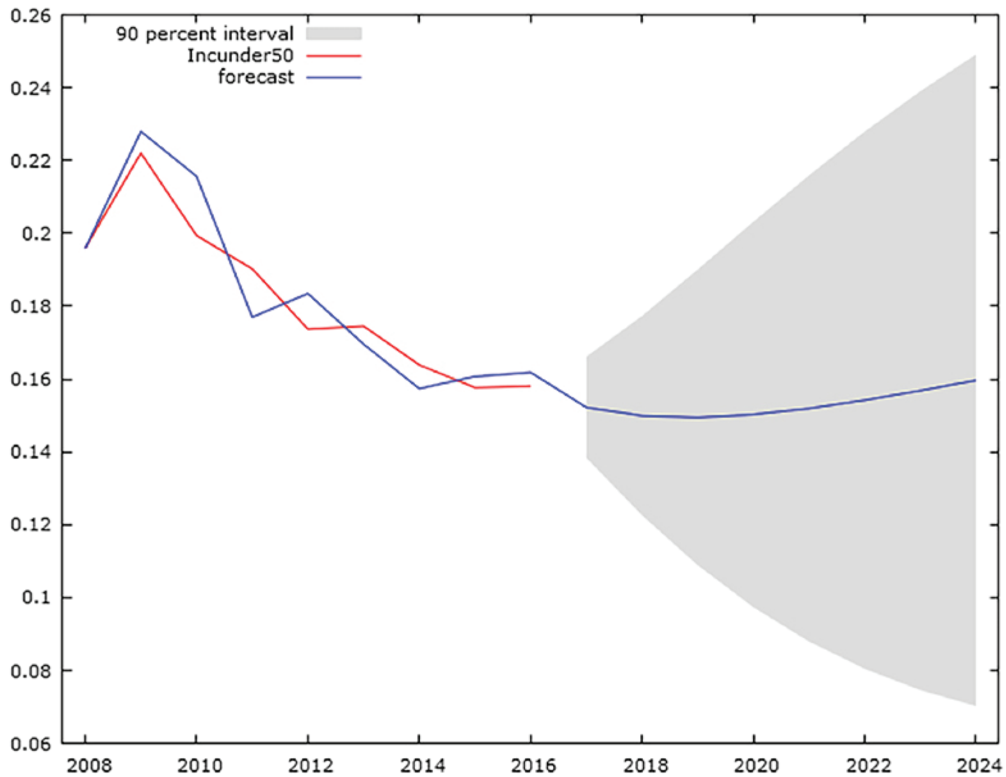
After the red line stops (2016), the remaining years are forecast values with uncertainty. The base estimate for the share of AGI in the under $50,000 category is for a slight decline until it levels off at around 15 percent of total income. The share is forecast to rise slightly in the out-years of our analysis (2023 and 2024).

The reason for this pattern is that unemployment is a strong predictor of the share of income in the under $50,000 income category. The relationship is direct, which is what we would expect. (see, e.g., Donovan, Labonte, and Dalaker, 2016). Higher unemployment predicts more income in the lowest income category relative to the other categories because tax filers fall into the lowest income category when unemployment increases.

The best fitting model for the share of income over $200,000 is an AR1 model with unemployment again as a predictor. For this category, the relationship is inverse; more unemployment leads to a reduction in the income share captured by those in the highest income category.

Figure 4 (next page) shows the results. The top income category is expected to get more income over the next couple of years, with an eventual leveling off due to the leveling off of unemployment. There is less uncertainty with this forecast than with our forecast of the income shares of filers with income less than $50,000, but this forecast still exhibits quite a lot of uncertainty.

Figure 3: Forecast model results, income category less than $50,000



Source: Authors' calculations from IRS Statistics of Income data and US Bureau of Labor Statistics (unemployment rate)

Our forecast of unemployment, based on economic data, predicts a decline until 2020 and a subsequent leveling off near its already very low level. Note that these results carry with them significant uncertainty. The uncertainty is driven by the short time frame of the analysis and the difficulty in predicting the trend in unemployment. If unemployment unexpectedly increases, we would expect the income share of the bottom category to rise, whereas if unemployment continues its downward trend, the share is predicted to fall.

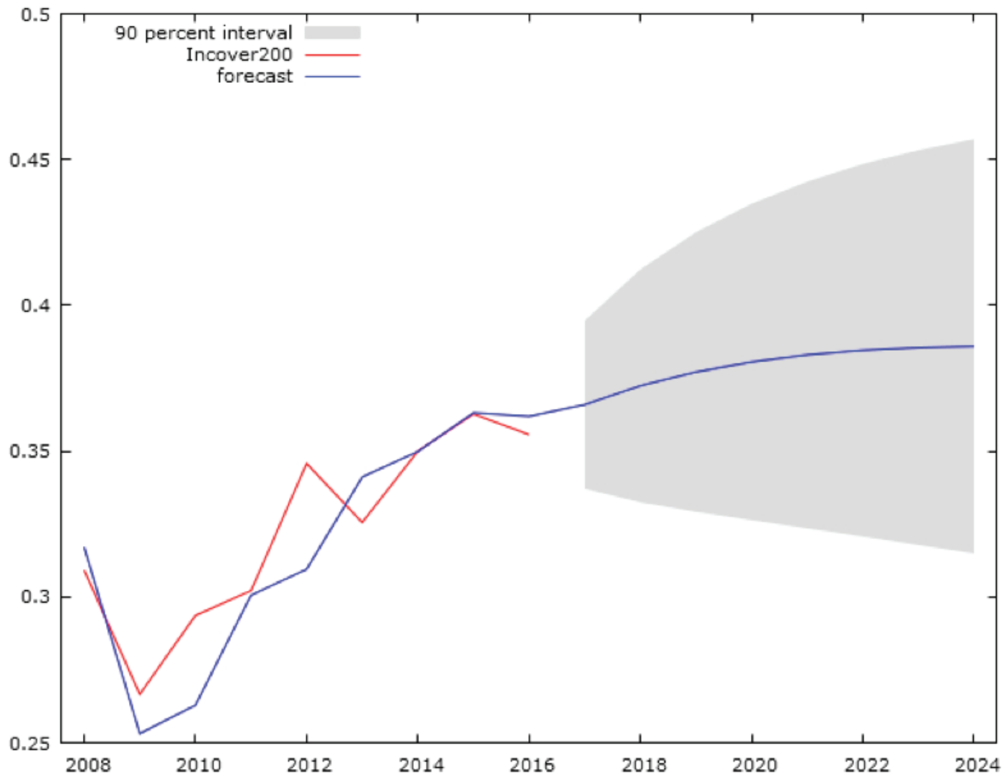
Figure 5 (next page) recaps the historical data and results from our base forecasting models for the income categories under $50,000 (red line) and $200,000 or more (blue line) along with the calculated top-bottom share. The top-bottom share is predicted to rise slightly from 2.25 in 2016 to 2.53 in 2020 and then slightly decline to 2.42 by 2024. This data along with results of our individual category forecasting model indicates a potential "leveling off" of inequality in the next few years.

Based on these analyses, we do not expect inequality to change dramatically over the next few years. In the near future, we expect changes in the distribution of tax burden by income class to be driven more by policy changes than by changes in the underlying distribution of income.

Determinants of tax revenue

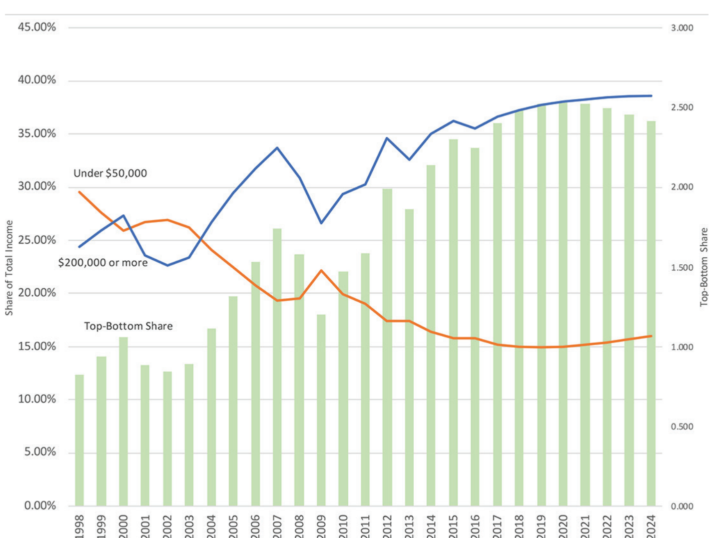
The amount of revenue that is raised by a tax system is determined by the product of the tax rate and the tax base. Government legislation sets the tax rate and defines the tax base and, if nothing else changed, the computation of tax revenue would be straight forward. Complications enter because the amount of tax base available to tax is ultimately determined by the behavior of private-sector actors. When tax policy changes, private-sector actors may change their behaviors. So, these changes must also be considered when forecasting revenue from a proposed tax-policy change.

Figure 4: Forecast model results, income category greater than $200,000



Source: Authors' calculations from IRS Statistics of Income data and US Bureau of Labor Statistics (unemployment rate)

Figure 5: Income shares for top and bottom income categories and top-bottom share ratio, Illinois 1998-2004



Note: Left axis is "Share of Total Income;" Right axis is "Top-Bottom Share

In the case of the personal income tax, households make decisions about how much to work, where to live, when and in what form to take their income, and numerous other things that affect their tax liability.

Similarly, employers make decisions about how many workers to hire, what to pay them, where to locate production, and numerous other things that will affect the income tax liability of their employees.

Economists call these behavioral changes "shifting".

Relationship between tax revenue and elasticity of taxable income (ETI)

Economists have been aware of this issue for many years and have done numerous very careful studies of tax-policy changes by the US federal government, by numerous state governments and in many other countries and settings. This research has yielded important insights about past experience.

To measure the cumulative effect of shifting behaviors, economists calculate the elasticity of taxable income (or ETI) which is the percentage change in the tax base—taxable income—as a result of a 1 percent change in after-tax earnings from an additional dollar of income.

For example, imagine a household making $50,000 that reduces its work hours slightly (perhaps by working a bit less overtime) so that its taxable income falls by $500 when tax rates increase. If the tax increase reduced after-tax earnings from the last dollar of income by 1 percent, the ETI would be positive 1 because after-tax income also fell by 1 percent (from $50,000 to $49,500). If taxable income instead went down by only one-half percent ($250), the ETI would be positive 0.5.

In general, economists expect and nearly always find that the ETI will be equal to or greater than zero because increases in after-tax earnings as a result of reductions in the tax rate stimulate households and employers to shift behavior in ways that increase the tax base. The reverse is also true. Reductions in after-tax earnings due to increases in tax rates stimulate households and employers to change their behavior in ways that diminish the tax base.

However, the revenue that governments realize may rise even if the tax base decreases when tax rates increase. For example, if after-tax earnings from the last dollar of earnings fall by 5 percent because of a tax increase while the taxable income falls by only 1 percent, total tax revenue will increase because the increase in the tax rate more than compensates for the fall in the tax base.

Consider a simple example with a tax base of $100 and a tax rate of 5 percent, so that prior to a change in the tax rate, total revenue is $100*.05=$5. Suppose that the tax rate is increased by 5 percent to 5.25 percent and that, because of this increase, the tax base falls by 1 percent (from 100 to 99, implying an ETI of 0.2). After the tax increase, revenue will be $99*.0525=$5.20 for an increase of 20 cents.

When the percentage change in taxable income is less than the percentage change in after-tax earnings from the last dollar of income (an ETI less than one) total revenue will increase as a result of a tax increase. If ETI is greater than one, total revenue will decrease as a result of a tax increase.

But there is an additional wrinkle when looking at the problem from the perspective of a state government. When the income tax base declines, both federal and state governments may lose revenue because there is substantial overlap between federal and state income tax bases. Because of this, it is perfectly possible that even if the elasticity of taxable income is greater than one—even much greater than one—total state income tax revenue will increase when state income tax rates are increased[4].

Recent estimates of ETI

As we explained previously, the elasticity of taxable income (or ETI) is a measure of the relationship between tax rates and taxable income. A thorough understanding of this relationship has been a major endeavor of the economics profession. Saez, Slemrod and Giertz (2012) is the most recent comprehensive review of the relevant literature. After a lengthy discussion of the theory and evidence, they conclude (p. 42) that:

> *While there are no truly convincing estimates of the long-run elasticity, the best available estimates range from 0.12 to 0.40...[e]ven at the top of this range the US margial top rate is far from the top of the Laffer curve [i.e. the rate at which increases in the rate would cause revenue to fall.] However...[t]here is much evidence to suggest that the ETI is higher for high-income individuals...[research] findings highlight the importance of the fact that the ETI is not an immutable parameter but can be influenced by government policies. For this reason, it is likely to vary across countries and within countries over time.*

These cautionary notes by some of the world's foremost experts suggest that any prediction about the economic effects of changes in tax policy should acknowledge considerable uncertainty.

A large body of relevant research demonstrates that tax-policy changes stimulate taxpayers to change their behavior in order to reduce their tax liability. Behavioral changes are of two main types: 1) reductions in work effort that have real economic consequences and reduce the amount of output in the economy and 2) sheltering (or avoidance) behaviors that change the form, location or timing of income (i.e. label income as generated in Indiana rather than Illinois) without effecting total economic output.

While both types of behaviors are relevant when calculating the short run revenue implications of tax-policy changes, they have very different implications for the ultimate economic burden (see Chetty 2009). Research also has demonstrated that, in the short run, in most cases behavioral change is sufficiently small that tax-rate increases (or broadening of tax bases) result in substantial revenue increases[5].

Thus, for the purposes of this study, it is important that we ask how Illinois revenue would respond to changes in Illinois tax rates. Fortunately, recent experience in Illinois provides some informative information about this relationship.

Figure 6 shows three graphs. The graph in the upper left shows Illinois' (average) personal income tax rate in each fiscal year from 1998 to 2018. Until 2010, the tax rate was constant but since that time it has varied quite a bit—first rising to 5 percent at the start of the 2011 calendar year and then falling to 3.75 percent at the start of the 2015 calendar year and then rising to 4.95 percent on July 1, 2017 at the start of the 2018 fiscal year.

The upper right graph shows Illinois personal income tax revenue in each fiscal year from 1998 to 2018.

Of course, the tax rate is only one of many variables that also include population growth and the business cycle that drive income tax revenue. Despite this, the graphs illustrate a clear relationship between income tax rates and revenue. During the sustained period with a constant 3 percent income tax rate, income tax revenue grew slowly. When the income tax rate rose, revenue also rose dramatically and when the income tax rate fell in 2015, income tax revenue fell as well.

The lower left graph shows the close relationship between percentage changes in the income tax rate and percentage changes in income tax revenue.

Figure 6:

Source: U. of Illinois Fiscal Futures Project and Illinois Department of Revenue

Recent increases and decreases in Illinois' personal income tax rates have been associated with essentially one-for-one changes in contemporaneous income tax revenue. In recent experience, on average a 10 percent increase in Illinois' personal income tax rate has been associated with a 10 percent increase in Illinois' personal income tax revenue. This very simple analysis suggests little behavioral change in response to tax changes (either increases or decreases) and a very low ETI. However, some more sophisticated analyses suggest caution.

Crosby and Merriman (2016) found that Illinois' economy underperformed compared to its Midwest peers after the 2011 increase in the personal and corporate income tax rates. After controlling for a number of factors, Crosby and Merriman found that, compared to a peer group of Midwest states that did not raise taxes, Illinois had lower employment, higher unemployment rates and lower hours worked than expected. They note that Illinois' relatively poor economic performance during this period (January 2011 through May 2014) could be attributable to political dysfunction or other factors not directly attributable to the tax increase.

A more recent paper (Spreen 2018) extends the analysis of Crosby and Merriman (2016) to also consider the sunset of the elevated tax rate in 2015 and to explicitly estimate the ETI. Spreen's empirical strategy is to create a control group by using a weighted average of states that performed in a similar way to Illinois prior to the 2011 tax increase. He finds (p. 255) that:

> *Illinois taxpayers responded to the 2011 income tax rate increase by reducing their reported incomes. The response estimated...translates to a state taxable income elasticity of 0.72...Analysis of the response across the income distribution shows that the aggregate income response is driven almost entirely by high-income households...I estimate an [ETI] of 0.78 for tax unites in the top decile of the income distrubtion...The results also show significant reversion following the sunset of the elevated tax rate in 2015.*

Spreen's result suggests that it is important to pay particular attention to how the ETI varies across the income distribution. Because higher income households tend to have relatively complicated sources of earnings including wage and capital income, and because these households may be relatively mobile and may have a lot of money at stake when taxes are levied, their ETI may be different than other segments of the population.

Several recent studies have focused on high-income households. Young and Varner (2011) study a 2004 policy in New Jersey that raised the marginal tax rate on incomes above $500,000 from 6.37 to 8.97 percent (260 basis points) using individual tax records from 2000 to 2007. This data allowed the authors to identify which households did not migrate, migrated out of the state, and migrated into the state.

The authors found that, on average over this period, New Jersey experienced net out-migration of 1.2 percent of tax filing units with incomes over $500,000 annually. Despite this, the number of tax-filing units in this income category increased substantially (43 percent) because more non-migrating tax-filing units obtained this level of income. Net out-migration of these very high-income households did increase after the 2004 tax increase, but the increase in migration was very small relative to the total number of these very high-income households.

For their more sophisticated statistical analysis, Young and Varner compare net out-migration of very high income (over $500,000) to households with slightly less income ($200,000 to $500,000). The households with income over $500,000 experienced a substantial tax increase which those with slightly lower income ($200,000 to $500,000) did not. The authors find that the tax increase had no impact on the relative migration patterns of these two groups.

Young and Varner's (2011) analysis provoked a replication and a substantial criticism by Cohen, Lai, and Steindel (2015) and a response by Young and Varner (2015). Cohen, Lai, and Steindel (2015) argue that Young and Varner's (2011) results are sensitive to several relatively arbitrary assumptions most importantly the use of net out-migration rather than separately considering in- and out-migration. Young and Varner (2015) reply that the replicated results are substantively quite similar to their original paper and show very small (or zero) increases in out-migration from New Jersey's tax increase on very high-income households.

Young et. al (2016) continued research on the topic, using administrative tax returns for all million-dollar income-earners in the United States over a recent 13-year period. The authors summarized their findings with respect to the effects of state income taxes on migration by saying (p.435) "State-to-state millionaire migration flows give positive but limited evidence of tax migration among top income-earners in the United States."

In a separate analysis using the same data in the same paper, the authors also ask whether very high-income households (millionaires) cluster on the low-tax side of state borders. They summarize the results of this analysis saying (p.439) "we see no evidence of short-run effects of (modest) tax-policy changes. Even in long-run models with larger and long-standing tax differences, the evidence that millionaires choose to live on the low-tax side of state borders is weak." Overall, they conclude that (p.439) "Millionaire tax flight is occurring, but only at the margins of statistical and socioeconomic significance".

Moretti and Wilson (2017) find, however, that one group of high earners—star scientists—are both very mobile and quite sensitive to tax rates with respect to migration decisions. They study scientists who are most prolific at obtaining patents. These scientists are in high demand and face frequent opportunities to move. Moretti and Wilson find that, on average, a 1 percent increase in after-tax income in a state increases the migration of such scientists by 1.8 percent in the long run. The authors note that papers focusing on star athletes (European soccer players) find similar quantitative results.

In summary, there is a voluminous, informative and growing literature on the relationship between income tax rates and taxable income. While there is a great deal of uncertainty, the best available current estimates show that, for the US as a whole, increases in tax rates substantially increase tax revenue and, at least in the short run, cause at most only modest declines in the tax base.

However, experts caution that the impact of any particular tax-policy change may vary depending upon the circumstances. We know that past increases in Illinois' (flat) income tax rate have resulted in substantial increases in revenue but have probably resulted in somewhat diminished economic activity. Research about increases in taxes on very high-income households shows that they have little or no impact on the location of those households in general but that they may have more impact on particular types (star scientists or professional athletes) of very high-income individuals.

Revenue and Burden Estimates: Answering Questions 3 and 4

Methodology, Assumptions and Data[6]

We attempted to investigate these questions using standard methodologies in the field. We relied on our extensive collective experience working in the field as well as a review of recent relevant academic literature and consultation with other experts. After doing this, we determined that the most appropriate approach to answering questions 3 and 4 was to develop a data set representing Illinois tax filers and to generate estimates of tax liability for each tax-filing unit in the data set using the National Bureau of Economic Research's (NBER) Taxsim27 program (see http://users.nber.org/~taxsim/taxsim27/).

In order to develop a data set representing Illinois tax filers, we gathered the most recent (2016) data available from the US Bureau of the Census Current Population Survey (CPS) from the IPUMS website (https://www.ipums.org/). CPS is a monthly US labor force survey covering the period 1962 to the present. We used the March 2016 supplement because that survey has the most comprehensive data relating to income, and we would need this data to estimate tax liabilities. We (primarily) used data from CPS respondents located in Illinois and after processing (explained in more detail below), obtained a sample 2,365 Illinois tax-filing units.

Taxsim27 is an online tax calculator that allows the user to feed in data about tax filers' sources and amount of income, family status, and other related variables. Taxsim27 is programmed to receive data on 27 variables and to estimate federal and state tax liabilities, as well as many other associated variables. Taxsim27 is (necessarily) simplified relative to actual federal and state tax calculations. Its results should be viewed as an unbiased estimate of actual tax liabilities. Taxsim27 estimates are widely used and the results are treated as credible by experts in the field of tax-policy analysis.

Raw CPS data does not contain information necessary to construct all of the 27 variables required by Taxsim27. We therefore augmented the CPS data. Most importantly, variables for family rent payments and mortgage payments are not part of the CPS dataset. These are important because they are included in the calculation of many state tax credit programs. Therefore, we imputed values for these variables from the American Community Survey. This is an annual national survey of approximately 3.5 million households designed to provide information on social, economic, housing, and demographic data (U.S. Census Bureau, 2018, p. 1). It contains information on housing costs, including rent and mortgage payments.

Imputation involves the estimation of values that are missing in a dataset by using one of several statistical approaches. Following Giertz and Ramezani (2018), among others, we estimated a "multiple regression" statistical model predicting the values of rent and mortgage payments in the ACS data. The multiple regression model involves the simultaneous estimation of the effects of several "predictor" variables on one of our variables of interest (rent payments or mortgage payments). Our primary predictor variables are household income and demographics such as the number of children and the type of household (marital status and presence of other family members). We then collected estimates of the effects of those predictor variables on rent payments and on mortgage payments and applied them to variables existing in the CPS dataset to predict the value of rent payments or mortgage payments. We used a variable in the CPS dataset that tells us whether the respondent rented or owned a home to determine whether a mortgage or rent payment should be recorded for each tax-filing unit.

Because we wanted to compare the relative performance of Illinois' personal income tax system with its potential performance if another state's tax system was adopted, we first calibrated the CPS data to match the income distribution of the 2016 Illinois resident personal income tax system reported by the Illinois Department of Revenue. Calibration, in economic analyses, is a process that requires the analyst to adjust their data to produce baseline results that match a subset of observed phenomena.

In this case, using techniques explained below, we weighted our (CPS) data to approximate the distribution and magnitude of adjusted gross income (AGI) of Illinois resident filers in 2016. Calibration is a widely used, although sometimes controversial, technique in economic research; especially economic research relating to tax policy (see Hansen and Heckman 1996.)

Our calibration procedure can be best understood with some explanation of the Illinois personal income tax system. Each year, the Illinois Department of Revenue (IDOR) releases reports with stratifications of individual income tax statistics (https://www2.illinois.gov/rev/research/taxstats/IndIncomeStratifications/SitePages/IITStratifications.aspx?rptYear=2016) that provide information about the number of tax filers, tax liabilities and other information stratified by adjusted gross income (AGI) class. A subset of the information released by IDOR in 2016 is copied in columns (A) through below (G) in Table 1 below.

As can be seen in the table, about 6.2 million Illinois personal income tax returns were filed in 2016. In total, these returns reported AGI of about $665 billion and tax liabilities of about $14.1 billion. Statistics for five AGI stratifications of Illinois resident tax filers are presented, ranging from less than $25,000 to more than $500,000.

Total returns, AGI and tax liabilities of non-Illinois returns (those without valid zip codes) are also reported. About 91 percent of tax returns have a valid Illinois address. Illinois returns account for about 92 percent of tax liabilities but only about 63 percent of AGI. Clearly non-Illinois returns, which account for 37 percent of AGI but only 8 percent of tax liability, are very different from Illinois returns. This makes sense because it is likely that non-Illinois filers earned only a portion of their income from Illinois-related activities and are therefore subject to the Illinois personal income tax on only a portion of their income.

Unfortunately, we do not have representative data about these non-Illinois filers. Even if we did, Taxsim27 is not programmed to compute liabilities for non-resident filers. Because of this, we restricted our analysis to resident Illinois filers who represent 91 percent of tax filers and 92 percent of tax liabilities.

Table 1

ILLINOIS DEPARTMENT OF REVENUE INDIVIDUAL INCOME TAX RETURNS FILED BY ADJUSTED GROSS INCOME - TAX YEAR: 2016 - FINAL Source: Final 1040 IIT Return File Dated Aug. 2018									
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
				IDOR Data (Illinois returns)			Calibrared CPS data (Illinois returns)		
AGI Range	Returns	AGI	Total Tax	Number of returns share	AGI share	Tax share	Number of returns share	AGI share	Tax share generated by Taxsim27
Less than-$25,000	1,958,801	$18,731,001,750	$569,297,624	34.6%	4.4%	4.4%	34.3%	4.4%	2.5%
$25,001-$50,000	1,277,434	$46,453,800,341	$1,308,244,341	22.5%	11.0%	10.1%	22.3%	11.0%	9.9%
$50,001-$100,000	1,327,647	$95,246,848,295	$2,677,381,369	23.4%	22.6%	20.6%	24.0%	22.6%	22.0%
$100,001-$500,000	1,044,338	$177,808,787,236	$5,473,347,007	18.4%	42.2%	42.1%	18.4%	42.2%	43.7%
$500,001 OR MORE	56,934	$83,262,811,491	$2,964,066,939	1.0%	19.8%	22.8%	1.0%	19.8%	21.9%
Illinois Totals	5,665,154	$421,503,249,113	$12,992,337,280	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Non-Illinois Totals*	560,388	$243,199,800,816	$1,126,346,092						
Totals	6,225,542	$664,703,049,929	$14,118,683,372						

*Returns with Non-Illinois Zip Codes (Non-Residents) or Invalid Illinois Zip Codes
Report ID: TDWR-IITEOY-018
Report Date: 9/20/2018 11:02:47 AM
Data Source: 2016_FNL2018

The appendix shows that, based on data released by IDOR, changes in the tax paid by non-Illinois filers closely tracked changes in the tax paid by Illinois filers. Because of this we are confident that the results of this study with respect to tax revenue are not sensitive to the exclusion of non-resident filers.

Information about our calibrated sample data is presented in columns (H) through (J) in Table 1. We were able to weight the sample we obtained from CPS to nearly exactly match IDOR data on share of tax returns in each AGI category and share of AGI in each AGI category. As mentioned above, Taxsim27 provides an estimate rather than an exact calculation of tax liability since it does not have access to the many individual circumstances that could influence a filer's tax liability.

Thus, even though our calibrated data is a close match to IDOR values for number of returns and AGI, Taxsim27's estimates of tax liabilities by AGI class is not a perfect match to observed IDOR tax liabilities by AGI class. This slight variance from observed data should not affect our conclusions about relative tax revenue (by AGI class) from comparison states (Wisconsin, Minnesota, Iowa or Missouri).

We ran the same set of data through Taxsim27 for Illinois and each of the comparison states so that conclusions about the relative cross-state tax revenue and distributions of burdens by AGI class do not depend upon exactly matching the observed distribution of Illinois tax burdens by AGI class.

We note one further adjustment to our data. In tax year 2016, Illinois' personal income tax rate was 3.75 percent. This rate was increased to 4.95 percent on July 1, 2017. Taxsim27 is not yet programmed to calculate 2018 tax liabilities, but we wanted to compare the amount of revenue raised by Illinois' 2018 tax system with the amount of revenue that would be raised by the comparison states if tax liabilities for the same group of taxpayers were calculated using their tax system. Therefore, we calculated Illinois' 2018 tax revenues by multiplying the Taxsim27 generated tax liabilities by the ratio (4.95/3.75)[7].

Comparisons of state income tax systems can be broken into two parts: comparisons of tax rates and comparisons of tax bases. While it is relatively straightforward to compare tax rates, comparison of tax bases can be complex.

Most states begin with federal definitions of AGI but then define their own system of exemptions, deductions and credits. An exemption may exclude certain types of income (e.g. military or religious income) from the tax system while a deduction allows the tax filer to reduce their reported income by a certain amount. A credit—child care for example—may reduce a tax filer's tax liability on a dollar-for-dollar basis.

Often deductions and credits can depend on family situation (e.g. single or married), age, occupation, etc. Both deductions and credits may be phased out as reported income increases. Because of these complexities, simple cross-state comparisons of rates can give a misleading impression of the relationship between income and tax liabilities.

Table 2 below presents some very basic information about the 2016 personal income tax systems of the states considered in this analysis. Our analysis using Taxsim27 considers tax rates, tax exemptions and tax credits and is a much more complete portrayal of the tax system than it is possible to incorporate in Table 2. More complete and detailed tax system comparisons are presented in Minnesota Center for Fiscal Excellence (2017) and Olin and Swain (2017) and updated tax rate information is presented in Loughead and Wei (2019).

A quick perusal of Table 2 demonstrates how a simple comparison of tax rates can be misleading. For the lowest income group (zero to $25,180) of single filers, Minnesota's tax rate of 5.35 percent is higher than the tax rate on the lowest income filers in each of the four other states. However, comparisons that take into account not only tax rates but also detailed consideration of tax bases show that Minnesota taxes low-income households less than almost any other state in the nation (see Minnesota Center for Fiscal Excellence 2017 and Wiehe, et al. 2018) because of its system of substantial deductions and tax credits for low-income tax filers.

Results

Our approach to comparing tax systems combines detailed information on tax bases of representative filers with information about tax rates, tax credits and tax exemptions that is programed into Taxsim27. We first present results of our empirical analyses in Tables 3a and 3b (next page) assuming that tax filers do not change their behavior when tax rates change. Table 3a (next page) shows median effective tax rates (calculated as tax liabilities/ AGI) for each state and AGI stratification. Median effective tax rates (ETRs) rise with AGI in all four comparison states as well as Illinois.

Thus, even though Illinois currently has a flat tax rate,

Table 2

Illinois, Iowa, Minnesota, Missouri, and Wisconsin

2016	Single Filer		Married Filing Jointly		Personal Exemption			Standard Deduction	
	Rates	Brackets	Rates	Brackets	Single	Married	Dependent	Single	Couple
Illinois	**3.75% of federal taxable income**		**3.75% of federal taxable income**		**$2,125**	**$4,250**	**$2,125**	**n.a.**	**n.a.**
Iowa	**0.36% >**	**$0**	**0.36% >**	**$0**	**$40**	**$40**	**$40**	**$1,970**	**$4,860**
	0.72% >	$1,554	0.72% >	$1,554					
	2.43% >	$3,108	2.43% >	$3,108					
	4,50% >	$6,216	4,50% >	$6,216					
	6.12% >	$13,896	6.12% >	$13,896					
	6.48% >	$23,310	6.48% >	$23,310					
	6.80% >	$31,080	6.80% >	$31,080					
	7.92% >	$46,620	7.92% >	$46,620					
	8.98% >	$69,930	8.98% >	$69,930					
Minnesota	**5.35% >**	**$0**	**5.35% >**	**$0**	**$4,000**	**$8,000**	**$4,000**	**$6,300**	**$12,600**
	7.05% >	$25,180	7.05% >	$36,820					
	7.85% >	$82,740	7.85% >	$146,270					
	9.85% >	$155,650	9.85% >	$259,420					
Missouri	**1.50% >**	**$0**	**1.50% >**	**$0**	**$2,100**	**$ 4,200**	**$1,200**	**$6,300**	**$12,600**
	2.00% >	$1,000	2.00% >	$1,000					
	2.50% >	$2,000	2.50% >	$2,000					
	3.00%>	$3,000	3.00%>	$3,000					
	3.50%>	$4,000	3.50%>	$4,000					
	4.00%>	$5,000	4.00%>	$5,000					
	4.50%>	$6,000	4.50%>	$6,000					
	5.00%>	$7,000	5.00%>	$7,000					
	5.50%>	$8,000	5.50%>	$8,000					
	6.00%>	$9,000	6.00%>	$9,000					
Wisconsin	**4.00% >**	**$0**	**4.00% >**	**$0**	**$700**	**$1,400**	**$700**	**$10,270**	**$19,010**
	5.84% >	$11,150	5.84% >	$14,820					
	6.27% >	$22,230	6.27% >	$29,640					
	7.65% >	$244,750	7.65% >	$326,330					

Sources: Kaeding (2016)

Table 3a

	Median state effective tax rates for identical taxpayers (by selected state tax systems and AGI stratification)				
AGI range	Illinois	Wisconsin	Minnesota	Iowa	Missouri
Less than-$25,000	0.90%	0.00%	-4.18%	0.00%	0.00%
25,001-$50,000	4.04%	3.09%	1.48%	3.43%	2.58%
$50,001-$100,000	4.33%	4.36%	3.39%	4.26%	3.50%
$100,001-$500,000	4.54%	5.14%	5.44%	5.08%	4.34%
$500,001 OR MORE	4.88%	6.70%	9.20%	5.66%	5.74%

The table reports estimated effective state income tax rates for each state and AGI grouping. The effective tax rate is calculated as tax liability/AGI. These estimates are based on 2016 state income tax systems except that Illinois revenues are scaled up to account for the fact that its flat tax rate increased from 3.75% in 2016 to 4.95% in 2018.

Sources: Weighted 2016 CPS data from Illinois, Taxsim27 estimates of tax liabilities and authors' calculations. See text for details.

Table 3b

	State income tax revenue relative to Illinois for identical taxpayers (by selected state tax systems and AGI stratification)			
AGI range	Wisconsin	Minnesota	Iowa	Missouri
Less than-$25,000	53%	-221%	151%	101%
25,001-$50,000	83%	33%	90%	74%
$50,001-$100,000	105%	85%	102%	90%
$100,001-$500,000	119%	129%	115%	101%
$500,001 OR MORE	141%	191%	115%	118%
Total	115%	115%	111%	99%

The table reports estimated income tax revenue relative to Illinois for each state and AGI grouping. These estimates are based on 2016 state income tax systems except that Illinois revenues are scaled up to account for the fact that its flat tax rate increased from 3.75% in 2016 to 4.95% in 2018.

Sources: Weighted 2016 CPS data from Illinois, Taxsim27 estimates of tax liabilities and authors' calculations. See text for details.

the system is somewhat progressive (average tax rates increase with income) because of Illinois' allowance for personal exemptions. The four comparison states are all more progressive than Illinois in the sense that their median effective rate on the lowest AGI category is lower than in Illinois, and their effective rate on their highest income category is higher than in Illinois.

A slightly different way of looking at the same underlying data is shown in Table 3b. This table is a direct response to question 3 and shows the tax revenue (relative to Illinois) raised in total, and for each AGI stratification, when a representative group of Illinois tax filers is subjected to the tax systems of four other states. In Table 3b, the value in each cell gives the ratio of the revenue Illinois would collect if it adopted the comparison state's tax system compared to the revenue it collects under its current tax system. A cell value greater than 100 percent means Illinois' revenue would rise for that AGI group if it adopted the comparison state's tax system and a value less than 100 percent means revenue would fall.

As shown in the "total" (bottom) row of the table, Wisconsin, Minnesota and Iowa all generate significantly more total revenue than Illinois when confronted with the same set of tax filers. Missouri's tax system generates 99 percent of the revenue generated by Illinois. As we look across the AGI distribution, Illinois generates more from the lowest income group (less than $25,000) than Wisconsin or Minnesota. Minnesota's exemptions and credits actually combine to generate negative net revenue from this group—the average low-income filer in Minnesota gets a subsidy rather than paying a tax.

Low-income taxpayers in Iowa contribute more revenue than those in Illinois while the burden in Missouri is quite similar. Illinois taxes on the next group of tax filers (AGI of $25,000 to $50,000) are considerably higher than those in the other four states and are triple the amount in Minnesota. Tax burdens between $50,000 and $100,000 are similar to Illinois across the four states with somewhat lower taxes in Minnesota and Missouri. Taxes on filers with AGI above $100,000 are higher than Illinois in all four states and nearly twice as high in Minnesota.

The calculations in both Tables 3a and 3b implicitly assume that tax filers' income would not change if relative tax rates were altered. A large body of economic research (some of which is discussed earlier in this report) finds that taxpayers often do change their behavior in response to changes in tax policy. That research stresses the finding that tax filers' reactions can vary depending on the circumstances of the tax system and can be difficult to predict. While we acknowledge this high degree of uncertainty, we believe it can be informative to present revenue calculations that incorporate the potential for behavioral reactions to tax-rate changes.

Spreen's (2018) analyses of tax-base changes in reaction to Illinois' 2011 and 2015 tax-rate changes provide helpful guidance about the potential magnitude of behavioral changes in Illinois in response to tax-rate changes. Spreen finds a taxable income elasticity of 0.72 overall, meaning that a 1 percent change in after-tax earnings from an additional dollar of income results in a 0.72 percent change in the tax base.

Of course, we might expect that behavioral reactions to tax-rate changes would differ across the income distribution and Spreen finds that "the aggregate response is driven almost entirely by high-income households...[filers in the top decile (10 percent) of the income distribution have]...state taxable income elasticity of 0.78." Economic theory (see mathematical appendix) allows us to recalculate relative revenue from Illinois' current (2016 modified to 2018 tax rate) system and revenue from other states' tax systems incorporating Spreen's elasticity estimates.

Table 4 incorporates Spreen's finding of an overall elasticity of taxable income (ETI) of 0.72 and assumes that all tax filers have this identical ETI. Comparing the results shown in Tables 3a and 4 we can see that, when we allow for this behavioral response to tax-rate changes the total revenue raised by other states is nearly unchanged compared to Illinois.

Table 4

	State income tax revenue relative to Illinois for identical taxpayers (by selected state tax systems and AGI stratification)			
	(assuming elasticity of taxable income of 0.72 for all AGI groups)			
AGI range	Wisconsin	Minnesota	Iowa	Missouri
Less than-$25,000	98%	-84%	152%	108%
25,001-$50,000	81%	34%	90%	74%
$50,001-$100,000	103%	82%	101%	90%
$100,001-$500,000	117%	124%	114%	100%
$500,001 OR MORE	137%	179%	115%	116%
Total	114%	113%	110%	99%

The table reports estimated income tax revenue relative to Illinois for each state and AGI grouping. These estimates are based on 2016 state income tax systems except that Illinois revenues are scaled up to account for the fact that its flat tax rate increased from 3.75% in 2016 to 4.95% in 2018.

Sources: Weighted 2016 CPS data from Illinois, Taxsim27 estimates of tax liabilities and authors' calculations. See text for details.

There are two reasons for this. First, even with the relatively high ETI estimated by Spreen the percentage change in taxable income will be relatively small because the state tax increase (resulting from moving from Illinois to other states) is small relative to the total (federal plus state) tax rate. For example, Illinois' 2011 tax increase from 3 to 5 percent was a 60 percent increase in the state tax rate but only a 5 percent increase in the total federal plus state tax rate for a tax filer that faced a 37 percent federal income tax rate on the last dollar earned.

A second reason to expect a small impact on total revenue when we allow for behavioral change is that moving tax filers from Illinois' tax system to other states' tax systems will generally decrease tax rates for some while increasing tax rates for others. Those tax filers who get a reduced tax rate are predicted to react by increasing their work effort (and therefore taxable income) and this can offset part, or all, of the decrease in taxable income by tax filers who reduce work effort and taxable income.

These offsetting effects are visible by comparing Tables 3b and 4. When we allow for behavioral change by incorporating an ETI of 0.72, the relative tax revenue generated by the lowest AGI group grows in all four states. For example, in Table 3b (with no behavioral change assumed, i.e. an ETI of 0) the lowest AGI group in Wisconsin generated only 52 percent as much revenue as in Illinois but in Table 4, where we allow for the fact that that group might work more if it faced a lower tax rate, it generated 98 percent of Illinois' revenue under the Wisconsin tax system.

We can see the opposite effect at the top end of the AGI distribution. In Table 3b, the top AGI group generated 141 percent of Illinois' revenue under Wisconsin's tax system. When we allow for behavioral change so that this high-AGI group of taxpayers might increase tax avoidance or evasion under Wisconsin's higher tax rate, only 137 percent of Illinois' tax revenue is generated. The same basic picture holds for other states and, in particular, refunds (negative tax payments) to the lowest AGI group fall in Minnesota due to behavioral change. Recall, however, that Spreen found that behavioral changes were largely confined to the highest-income tax filers who probably have the greatest mobility and the greatest ability to reconfigure their incomes to minimize tax burdens.

To quantify the potential impact of behavioral change confined to the top income group in response to tax-policy change, Table 5 assumes a zero ETI for the bottom 90 percent of the AGI distribution but, consistent with Spreen's empirical finding, an ETI of 0.78 for the top decile (10 percent) of the income distribution.

Table 5

	State income tax revenue relative to Illinois for identical taxpayers (by selected state tax systems and AGI stratification)			
	(assuming elasticity of taxable income of 0 for botton 90% of AGI distribution and elasticity of taxable income of 0.78 for top decile of AGI distribution.)			
AGI range	Wisconsin	Minnesota	Iowa	Missouri
Less than-$25,000	53%	-221%	151%	101%
25,001-$50,000	83%	33%	90%	74%
$50,001-$100,000	105%	85%	102%	90%
$100,001-$500,000	117%	125%	114%	100%
$500,001 OR MORE	136%	178%	115%	116%
Total	114%	110%	110%	99%
The table reports estimated income tax revenue relative to Illinois for each state and AGI grouping. These estimates are based on 2016 state income tax systems except that Illinois revenues are scaled up to account for the fact that its flat tax rate increased from 3.75% in 2016 to 4.95% in 2018.				
Sources: Weighted 2016 CPS data from Illinois, Taxsim27 estimates of tax liabilities and authors' calculations. See text for details.				

Comparing Table 5 and Table 3b, we see that the assumption of behavioral changes by the top income group causes only a small drop in the revenue generation of these four states. For example, Wisconsin's revenue falls from 115 percent to 114 percent of Illinois' when we allow for behavioral change in the top income group in response to tax-policy change. The change is somewhat larger in Minnesota, but the total effect is still quite small.

Summary

In summary, our empirical analyses suggest that, compared to the four neighboring states, Illinois' tax system collects less revenue and the revenue that Illinois does collect comes disproportionately from the lowest income categories compared to the other states. Allowing for behavioral change in response to tax-policy changes does not alter, and under some assumptions reinforces, this conclusion.

Appendix

Comparing overtime changes in AGI and tax revenue from Illinois and non-Illinois returns

As noted in the text, we lacked sufficient data about returns filed by non-Illinois filers to estimate the tax liabilities of these filers were Illinois to adopt the tax system of the other states considered in our report. We wondered whether the elasticity of taxable income (ETI) of these non-Illinois filers might be significantly different from the ETI of Illinois filers. In particular, some readers might be concerned that non-Illinois filers might have a significantly higher ETI than Illinois filers and hence might have the flexibility to escape Illinois taxation should Illinois tax rates rise.

We hope to shed some light on this question by looking at the historical record. Each year since 2008, the Illinois Department of Revenue has posted data about the observed total AGI and tax payments of Illinois and non-Illinois filers. Figure A1 shows a graph of the raw data over time. The total AGI in both groups has been growing over time, as have the total tax payments. There was an obvious and substantial growth in tax payments by Illinois returns when the tax rate increased from 3 to 5 percent in 2011. There was also an increase in tax payments by non-Illinois returns at that time, but precise relationship is difficult to see in Figure A1 because of the difference in scale between Illinois and non-Illinois returns.

Figure A2 (next page) allows more direct comparison by showing the percentage changes in AGI and tax payments for Illinois and non-Illinois returns. The figure on the left clearly shows that the AGI of non-Illinois returns is much more volatile than the AGI of Illinois returns. In some years, the growth in AGI for non-Illinois returns has exceeded 50 percent while it has been substantially negative in other years. AGI reported on Illinois returns fluctuates in a much narrower range.

Despite this, the graph on the right shows that the percentage change in tax liabilities of Illinois and non-Illinois returns closely track each other. When tax payments of Illinois returns grew substantially following the 2011 tax increase, tax payments of non-Illinois returns grew in parallel and actually increased at a slightly faster pace compared with tax payments of Illinois returns.

When the tax rate increase started to expire in 2015, the rate of growth of tax payments fell substantially (and in parallel) for both Illinois and non-Illinois returns. This preliminary evidence suggests that, based on the historical experience, there is currently no reason to believe that the ETI of non-Illinois returns is significantly different from the ETI of Illinois returns.

Figure A1

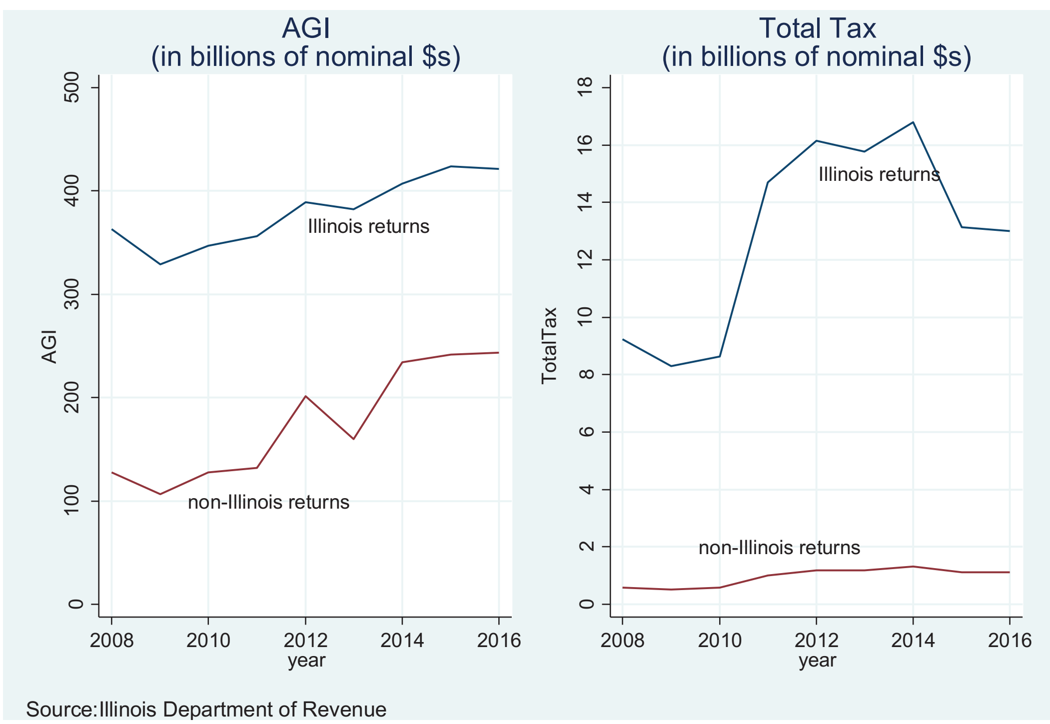
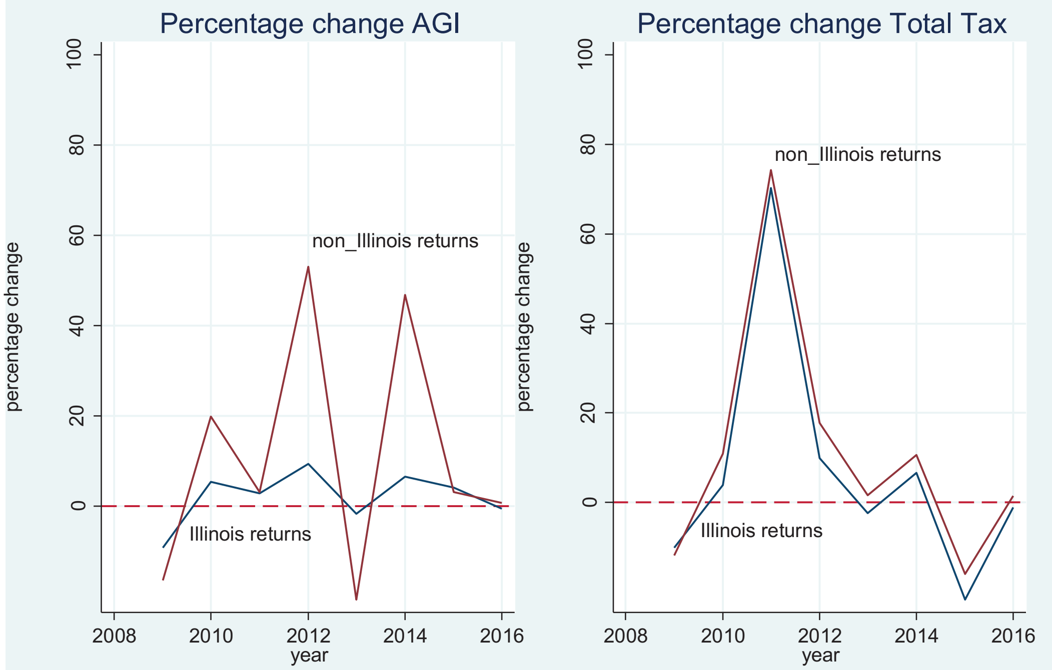


Figure A2



Source:Illinois Department of Revenue and authors calculations

Mathematical Appendix
Derivation incorporating behavioral change into revenue estimates
Chuanyi Guo

Denote that subscript S and F refer to State and Federal, respectively.
Denote that subscript N and O refer to New and Old, respectively.

Assuming that only state marginal tax rate (τ_S) changes from τ_{OS} to τ_{NS}.
Federal marginal tax rate (τ_F) keeps constant.
Denote that ε_{ETI} is the elasticity of taxable income (ETI). Then we have:

$$\varepsilon\_ETI = (\ \%\Delta Base)/(\ \%\Delta(1-\tau\_S-\tau\_F\ )\ ) = (\Delta Base/\ 〚Base〛\_OS\ )/(\Delta(1-\tau\_S-\tau\_F\ )/(1-\tau\_OS-\tau\_F\ )) = \Delta Base/\Delta(1-\tau\_S-\tau\_F\ )\ \ (1-\tau\_OS-\tau\_F)/\ 〚Base〛\_OS\ , \quad (1)$$

$$\Delta Base = Base_{NS} - Base_{OS}, \quad (2)$$

$$\Delta(1-\tau_S-\tau_F) = (1-\tau_{NS}-\tau_F) - (1-\tau_{OS}-\tau_F) = \tau_{OS} - \tau_{NS}, \quad (3)$$

where $Base_{OS}$ is the income tax base (taxable income) before the state marginal tax rate change.
$Base_{NS}$ is the income tax base (taxable income) after the state marginal tax rate change.

Also, note that

$$Rev_s = Base_S * \tau_S, \quad (4)$$

where Rev_s is the amount of revenue from state taxes and $Base_s$ is the state tax base.

Therefore, the change in revenue when the tax rate changes is

$$\Delta Rev_s = Rev_{NS} - Rev_{OS}, \quad (5)$$

$$\Delta Rev_s = Base_{NS} * \tau_{NS} - Base_{OS} * \tau_{OS}, \quad (6)$$

From (1), we know that: $\Delta Base = \varepsilon_{ETI} * Base_{OS} * \frac{\Delta(1-\tau_S-\tau_F)}{1-\tau_{OS}-\tau_F}$.
Therefore, we have:

$$Base_{NS} = Base_{OS} + \Delta Base = Base_{OS} + \varepsilon_{ETI} * Base_{OS} * \frac{\Delta(1-\tau_S-\tau_F)}{1-\tau_{OS}-\tau_F};$$

$$Base_{NS} = Base_{OS} * \left(1 + \varepsilon_{ETI} * \frac{\Delta(1-\tau_S-\tau_F)}{1-\tau_{OS}-\tau_F}\right) \quad (7)$$

Plug (7) into Eq.(6), we have:

$$\Delta Rev_s = Base_{OS} * \left(1 + \varepsilon_{ETI} * \frac{\Delta(1-\tau_S-\tau_F)}{1-\tau_{OS}-\tau_F}\right) * \tau_{NS} - Base_{OS} * \tau_{OS},$$

$$\Delta Rev_s = Base_{OS} * \tau_{OS} * \left[\left(1 + \varepsilon_{ETI} * \frac{\Delta(1-\tau_S-\tau_F)}{1-\tau_{OS}-\tau_F}\right) * \frac{\tau_{NS}}{\tau_{OS}} - 1\right],$$

$$\Delta Rev_s = Rev_{OS} * \left[\left(1 + \varepsilon_{ETI} * \frac{\Delta(1-\tau_S-\tau_F)}{1-\tau_{OS}-\tau_F}\right) * \frac{\tau_{NS}}{\tau_{OS}} - 1\right] \text{ (because of Eq.(4))},$$

$$\Delta Rev_s = Rev_{OS} * \left[\left(1 + \varepsilon_{ETI} * \frac{\tau_{OS}-\tau_{NS}}{1-\tau_{OS}-\tau_F}\right) * \frac{\tau_{NS}}{\tau_{OS}} - 1\right] \text{ (because of Eq.(3))}.$$

Endnotes

1 In 2009, Frank published a paper (Frank 2009) documenting one of the first attempts to construct a large-scale dataset of state income distribution measures over a long period of time. Up to that point, most of the state inequality data was only available during census years (1980, 1990, etc.). Frank constructed a consistent time series of data going back to 1917 using data published in the U.S. Internal Revenue Service Statistics of Income (SOI) series (https://www.irs.gov/statistics). Since publication of his research, Frank has maintained a dataset available on the web (https://www.shsu.edu/eco_mwf/inequality.html). The most recent year of data available is 2015. Frank's data is confined to the distribution of income among the top group of income earners. Because we were also interested in income shares throughout the income distribution, we also collected our own data from SOI during the period 1998 to 2016.

2 It should be noted that this definition of income is not universally accepted. Both Burkhauser, et.al. (2012) and Auten and Splinter (forthcoming) use different definitions of income and find different magnitudes of the inequality changes since the late 1970s. However, the general shape of the time-trend of income distribution is the same in their work and the measure used by Frank and others (e.g., Piketty, Saez and Zucman (2018) is the more commonly cited one.

3 Elsewhere, Piketty, Saez and Zucman (2018, Table II) find that for the period 1980-2014, pre-tax incomes for households in the top 1 percent of incomes grew by 205 percent while pre-tax incomes for the top 10 percent grew by 121 percent, a rate just over one-half as fast (the incomes of the top 0.001 percent of households grew by 636 percent while the incomes of households in the bottom 50 percent grew by just 1 percent).

4 Consider a simple example showing that state tax revenue may increase even when total (federal plus state) tax revenue declines. Suppose that the initial tax base is $100. The federal tax rate on the last dollar of income earned by high income earners is 37 percent and the state tax rate on income is 5 percent so that the combined rate is 42 percent. Federal revenue prior to the state changing its tax rate would be $37 while state revenue is $5. Suppose that the ETI is very high – say 2.0. Now the state enacts an income tax increase to 6 percent. This implies that the overall marginal tax rate increases from 42 percent to 43 percent, and after-tax income from the last dollar earned falls from 58 to 57 cents—a decrease of 1.75 percent. With an ETI of 2.0, the tax base will decrease by two times 1.75 percent or 3.5 percent to $96.50.

Since the federal tax rate did not change, federal government revenue will fall (to $35.70=37 percent*96.50), but state government revenue will increase to $5.79. An increase in the state tax rate has therefore caused total (federal plus state) revenue to decline (from $42 to $41.49) but state revenue has actually increased. In essence, the fact that the federal and state governments tax overlapping bases has made it easier for state governments to raise tax rates while not losing state revenue. Even when the total income tax base is quite elastic—that is it falls rapidly when income tax rates increase—state revenue can increase substantially with increases in state income tax rates. In this case, the ETI would have to be greater than 9.5 for state tax revenue to fall after the tax-rate change

5 Recent methodologically sophisticated studies by Weber (2014) and Burns and Ziliak (2016) estimate ETIs (0.858 and 0.4 to 0.55, respectively) that are greater than the "best available estimates" in Saez, Slemrod and Giertz (2012). Both Weber (2014) and Burns and Ziliak (2016) acknowledge a range of possible estimates depending on the precise statistical formulation that they use to obtain the estimates. Each of these studies estimates the ETI for the aggregate of all (state and federal) tax rates on income. As explained above however, even if income is quite elastic with respect to the total tax rate (i.e. the ETI exceeds 1) it may be possible to substantially increase the state tax rate and to obtain a substantial increase in state tax revenue.

6 Bruno and Manzo (2019) analyze related questions using quite different methodologies.

7 We are unable to take into account changes in state tax revenue and state tax liabilities by AGI stratification as a result of the Tax Cut and Jobs Act (TCJA), which took effect in the beginning of the 2018 calendar year. Although the TCJA directly affected federal tax policy it may have had an indirect effect on state tax policy because many states link the definitions of their tax policies to federal tax policies (See Auxier and Sammartino 2018). We cannot directly calculate state tax-policy changes in reaction to the TCJA because, as of late April 2019 Taxsim27 had not yet updated its state tax simulations to account for post-TCJA changes in state tax policy.

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