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Fundamental State Tax Reform: Eliminating the Income Tax in Wisconsin

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Abstract

The state of Wisconsin has the oldest continuously operating state income tax in the United States. In this report I develop and analyze a plan to dramatically change that history. I first document that, even though the state has seen income tax reductions over the past decade, the state income tax remains one of the highest in the country. By contrast, the state's sales tax is among the lowest. Therefore, I consider a tax reform to eliminate the state income tax and make up some of the lost revenue by increasing the sales tax. I discuss how Wisconsin's progressive income tax compounds the distortions in the federal tax code. I also highlight that the vast majority of Wisconsin businesses, covering the majority of employment in the state, pay under the personal rather than the corporate income tax. Thus, in addition to distorting household decisions on working and saving, the personal income tax is a tax on small businesses in the state. While I consider a variety of policies, my baseline reform eliminates the income tax and increases the sales tax rate from 5% to 8%. To evaluate the impact of the reform, I develop a structural dynamic general equilibrium model of the Wisconsin state economy. While official state revenue estimates include no behavioral response to taxation, my model incorporates the responses of workers, consumers, and businesses to the tax reform. I find that the tax reform is strongly pro-growth. The reform leads to 7.9% higher output and 6.9% higher employment in the long-run, with a long-run net tax cut of 12.6% of state tax revenue. I also analyze the transitional dynamics in response to two implementations of the reform plan: an immediate elimination and a phased-in plan. Phasing in the reform reduces some of the near-term revenue losses, at the cost of delaying the positive economic growth impact.

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Executive Summary

Wisconsin has the oldest state income tax in the United States, and the state government currently relies heavily on income tax revenue. However, the state income tax is:

- Inefficient: The progressive state income tax compounds the distortions from the federal income tax, leading to total marginal tax rates of nearly 48% for some households. Further, phase-outs of deductions and credits mean that middle income households in Wisconsin pay effective marginal state income tax rates as high as 9.8%, two percentage points above the top statutory rate for the highest incomes.
- Not competitive: Although Wisconsin has reduced its tax burden in recent years, the state remains one of the highest-taxed and has the 9th highest top tax rate in the country. Income taxes have strong impact on migration and business location decisions, while Wisconsin has seen net outmigration in recent years.
- A distortionary tax on most small businesses: Nearly 9 in 10 businesses in the state, employing more than half of all workers, pay taxes under the individual income tax. Wisconsin's state income tax, and the high top rate in particular, reduces the incentive of these businesses to hire and invest in the state.

By contrast, sales taxes in Wisconsin are relatively low, with a combined state and local rate which is the 3rd lowest among the states with a sales tax. Unlike the income tax, empirical evidence shows modest economic impact of increases in state sales taxes.

Thus, I consider a reform to eliminate the Wisconsin state income tax, while increasing the state general sales tax to cover some of the reduction in tax revenue. For simplicity, I do not change the base of the sales tax, which covers roughly half of household expenditures. While I consider a variety of policies, I focus on a plan which increases the state sales tax rate from 5% to 8%.

To analyze the impact of the reform, I construct a dynamic model of the state economy. The model includes many of the key channels which capture the responses of households and businesses to changes in tax policy:

- Higher after-tax wages encourage work by households and migration into the state.
- Lower taxes on business reduce the cost of capital and encourage hiring and investment.
- Higher sales taxes favor saving over spending out of current income.

These incentive effects lead to important dynamic impacts:

- With greater employment and a larger capital stock, economic output, wages, and household incomes will grow.
- As people have more income, the level of consumption will increase, even as the share of income consumed falls.

I show that these behavioral and dynamic effects are important for evaluating the impact of the tax reform, not only on tax revenue but also on economic outcomes like output, employment, and incomes. By contrast, official state revenue estimates include **no** behavioral responses to taxes.

I quantitatively evaluate the impact of the proposed tax reform, both in the long-run and in the immediate years following the reform. I consider two reform implementations: an "all-in plan" which in the first budget year eliminates the income tax and increases the sales tax to 8% and a "phase-in plan" which over the course of four two-year budget cycles gradually eliminates the income tax while gradually increasing the sales tax. The long-run impact of both plans is the same. Phasing in the reform reduces some of the near-term revenue losses, at the cost of delaying the positive economic growth impact.

Focusing on the all-in plan, I estimate that eliminating the state income tax and increasing the sales tax to 8% would:

- Lead to an average net tax cut of roughly $1,700 per household, including both the income tax reduction and the sales tax increase.
- Increase state output by roughly 1 percentage point per year for each of the first five years, and a total long-run output gain of 7.9%. The Wisconsin economy would be about $28 billion larger after the reform than otherwise.
- Increase employment by 6.9%, or about 175,000 jobs, in the long run, with most of the gains coming in the first five years. The employment gains would be driven by labor supply, with increased hours and participation of residents, as well as in-migration.
- Increase after-tax income by about 9.4%, which would fuel an increase in consumer spending of about 7.2%, even after facing a higher sales tax.
- Lead to a long-run reduction of 12.6% of state tax revenue. This is roughly half the revenue loss that would be estimated without considering behavioral or dynamic impacts. The first state budget would see a revenue reduction of about $3.5 billion relative to current policy. For several years after that point, tax revenue would grow faster under the reform than under current policy.

In summary, fundamental tax reform has the promise of transforming the economy in the state of Wisconsin, substantially improving economic outcomes, and living standards.

1. Introduction

> *"Prior to 1912, the history of state income taxes in this country failed to disclose a single instance in which the tax had been successful as a revenue producer or had justified itself as a practical or desirable method of taxation…. In the face of these experiences it is somewhat remarkable that the people of Wisconsin should suddenly -- and apparently spontaneously -- reach the conclusion that a state income tax was necessary and desirable." Kennan (1915).*

Although it is often claimed that in 1911 Wisconsin became the first state to establish an income tax (Ohlin, 2019), a more accurate claim is that it was the first state to implement a *workable* income tax (Stark, 1987). As the quote above notes, other states had previously tried and failed to tax incomes. By contrast, Wisconsin's income tax started two years before the ratification of the Sixteen Amendment allowed for a federal income tax, and has remained in place ever since. This paper develops and analyzes a plan to dramatically change that long history by eliminating the state income tax.

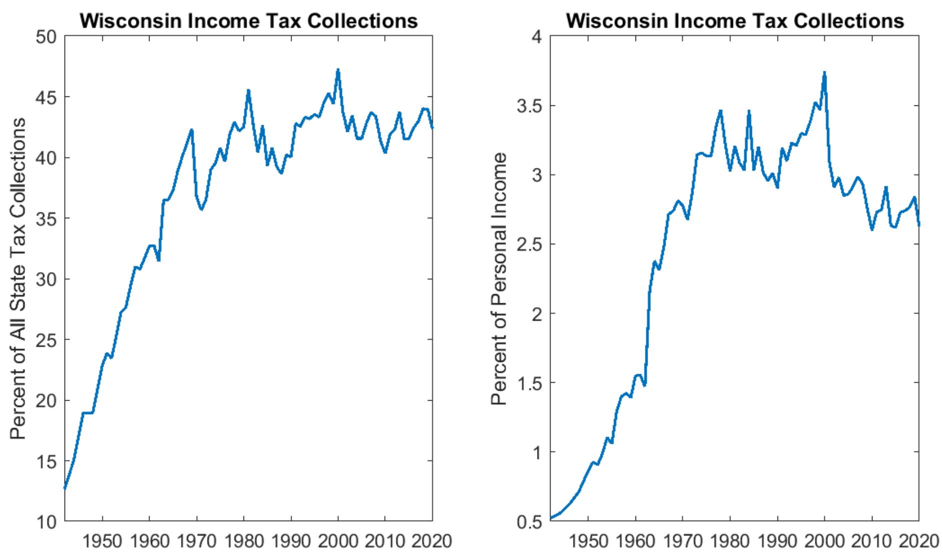

Figure 1: Wisconsin income tax collections as a percentage of all state tax collections (left panel) and as a percentage of total state personal income (right panel).

From the beginning in 1911, the Wisconsin income tax was highly progressive, with the first $1,000 of income taxed at 1% and each additional $1,000 taxed at a higher marginal rate, up to a top rate of 6% on income over $12,000, which is over $346,000 in 2021 dollars. Over time the tax rates and tax brackets have been regularly adjusted, with the top tax rate hitting a peak of 11.4% from 1972-1978, and remaining at 10% or more from 1962-1986 (Ohlin, 2019). With increases in tax rates and an expansion of the tax base came an increase in the tax collections, as shown in Figure 1. The left panel shows that the income tax grew from 12.6% of state tax revenue in 1942 to over 42% by 1969, and in recent years has varied between 40-45%. The right panel shows that income tax collections grew from 0.5% of total state personal income in 1942 to over 3% by the 1970s. State tax reforms in recent years have reduced that share from a peak of 3.7% in 2000 to an average of 2.7% over the past decade.

In recent years, Wisconsin policymakers have cut income taxes, but have focused on reducing rates more at the lower end. The lowest rate fell from 4.6% in 2012 to 3.54% in 2021, while the top rate was cut by only 0.1 percentage points in 2013 and has remained at 7.65% ever since. These changes have reduced Wisconsin's state and local tax burden, which according to the Tax Foundation fell from 11.7% in 2010, and a ranking of 46th lowest, to 10.7% in 2019 and a ranking of 37th lowest (York and Walczak, 2021). But while the state has become more competitive, it remains among the highest-taxed states. Moreover, as I discuss more below, the state's high top income tax rate (9th highest in the US) is a particular barrier to economic growth, as the vast majority of businesses in the state pay personal, rather than corporate, income taxes. Thus, the personal income tax functions as a tax on business capital, leading to lower investment, employment, and output. By contrast, Wisconsin's state sales tax is comparatively low, and consumption taxes in general are less distortionary. Thus, the tax reform plan increases the sales tax to cover some of the revenue lost from eliminating the income tax.

Analyzing the economic impact of such a fundamental reform requires a close evaluation of how taxation affects behavior. In particular, since a major goal of the tax reform is to spur economic growth, it is vital to account for the dynamic impact of tax changes on the economy, which will feed back to tax revenue. By contrast, official Wisconsin state revenue estimates, such as those provided by the Legislative Fiscal Bureau and the state Department of Revenue, include no behavioral responses to tax changes. But of course, taxation has both static (within a period) and dynamic (over time) feedbacks. Within a period, a lower income tax increases effective after-tax wages for workers, which would increase labor supply. At the same time, a lower cost of capital for businesses encourages hiring and investment. Higher sales taxes favor saving over spending, so the share of income consumed falls even as the level of consumption increases with a net tax cut. Over time, with more investment and savings, capital, output, employment, and incomes will grow. With the growth of output and consumption, the tax base will expand, so revenue will increase to make up at least part of what was lost with tax rate reductions. Below I compare my dynamic estimates of the impact of reform with static estimates similar to those produced by state agencies, and in the baseline reform I find that behavioral responses to taxation make up roughly half of the lost revenue. But even more important than the revenue analysis, the dynamic model shows the impact of the tax reform on key economic outcomes such as output, employment, investment, and incomes in Wisconsin.

To evaluate the impact of tax reform we need a counterfactual to know what would happen with and without the policy change. The dynamic macroeconomic model that I develop allows for just this type of policy analysis. The model is similar to those used to analyze economic output and tax reform nationally, but is modified to analyze state tax reform. In the model, the state is a small open economy, which means that capital and labor are mobile across state borders. The state trades with the rest of the country, and indeed the world, but since the state is small, interest rates are set on national markets. Households in the model face state sales taxes on consumption, as well as progressive federal and state income taxes on labor and capital income. Businesses in the model face taxes which differ depending on their legal form: corporations (C-corporations) face the combined state and federal corporate income tax, while pass-through businesses (sole proprietorships, partnerships, and S-corporations) face the combined state and federal personal income tax. Businesses are taxed on profits with a depreciation allowance, which means that the business taxes are effectively a tax on their capital.

To evaluate the tax reform, I first calibrate the parameters of the model in order to match features of the Wisconsin economy under current law, including current state tax policy. Then I introduce the changes in state tax policy, eliminating the state income tax and increasing the sales tax. I consider different variations of this reform which fall under two main versions: a one-time change where the reform all takes place within the first budget year, and a phase-in where the income tax is gradually reduced, and sales tax gradually increased over a sequence of years. In each case I analyze the transitional dynamics from steady state associated with current law to the steady state with no income tax. Both the phase-in and the “all-in” plans end up at the same long run outcome, but the transitions differ.

My baseline reform consists of eliminating the income tax and increasing the state sales tax from 5% to 8%, although I also consider other variations on this reform. For simplicity (and political feasibility), I keep the base of the sales tax fixed. As discussed below, the Wisconsin sales tax has significant exemptions, which mean that only about half of consumption is subject to the general sales tax. Even accounting for increased output from dynamic model, the baseline tax reform is a substantial net tax cut. As I show below, a revenue neutral sales tax rate is approximately 9.4% on a dynamic basis and over 12.5% on a static basis, while my reforms only go up to 8%. I show that an average household in Wisconsin pays nearly $2,800 in income taxes, while the increased sales tax would add nearly $1,100 in taxes. Thus, the reform means a tax cut of roughly $1,700 per household. So, in addition to changing the tax structure, this reform is a substantial tax cut.

Importantly, I find that the tax reform is significantly pro-growth. Eliminating the state income tax leads to 7.9% higher output and 6.9% higher employment in the long-run, with a long-run net tax cut of 12.6% of state tax revenue. I show that this revenue reduction is only about half as large as the 26.8% revenue drop that would be assessed under a static scoring approach which doesn’t consider behavioral responses to taxation. In addition to the long-run outcomes, I analyze the dynamics of the state economy following implementation of the reform. Eliminating the income tax and increasing the sales tax all at once, what I call the “all-in” plan, leads to rapid growth impacts, but also an immediate tax revenue reduction of about $3 billion. Phasing in the tax reform by gradually lowering the income tax and increasing the sales tax over a period of eight years moderates the impacts. The phase-in plan lowers the near-term revenue drops, leading to short-term dynamic revenue decreases of $1.1 billion or less, but at the cost of delaying some of the growth effects. For example, after five years output is 2.8% higher than under current law with the phase-in plan, as opposed 5.2% higher under the all-in plan. Some of the behavioral responses are relatively rapid as employment increases, but some take longer due to investment and the buildup of capital. Under either scenario, eight years after the reform starts, the model suggests that the state would see output gains of over $25 billion and an increase of over 170,000 in employment. Gains this large are relatively rare in policy evaluation, but so are policy changes of this magnitude, and my estimates are in line with others in the literature. Such a fundamental policy change could have a transformative impact on the state economy.

Since higher income households pay the majority of income taxes in the state, eliminating the state income tax will have more direct benefit to them. Furthermore, since lower income households consume a larger share of their income, increases in the sales tax would mean that, even though a large share of purchases are exempt from the sales tax, some of these households would face a larger net tax bill under the reform. However, the model shows that wages and incomes would grow across the state as a result of the reform, which suggests that dynamically all households would gain from the reform.

The rest of this paper is organized as follows. In the next section I discuss Wisconsin's current tax situation compared to the rest of the US, and also note several features of the state's current income tax structure. Although most income taxes are paid by high income filers, many of these consist of pass-through businesses. Further, middle income households pay the highest effective marginal income tax rates in the current system.

Section 3 then lays out the model that I use for policy evaluation. The model views Wisconsin as a small open economy, facing progressive state and federal income taxes, as well as business income taxes dependent on the legal form. I also discuss how I use state level aggregate and micro data to calibrate the model, matching key aspects of the state economy under current law. Section 4 presents the results, analyzing the impact of the baseline reform, first focusing on long-run impacts under a variety of sales tax rates, then considering transitional dynamics under both the phase-in and all-in plans. Finally, Section 5 concludes.

2. Wisconsin's Current Tax Situation

In this section I discuss several important background, institutional, and comparative factors on Wisconsin's current tax situation which bear on the proposed tax reform. First, I discuss the structure of the state's income tax, how Wisconsin compares to other states, and the distribution of the income tax and effective tax rates. Then I do the same for the state sales tax. In broad terms, Wisconsin has a comparatively high income tax and low sales tax. Next, I discuss some additional features of the state income tax which limit its effectiveness and increase economic distortions. I show that, after accounting for phase-outs of deductions and credits, middle-income households face the highest effective marginal tax rates in the state. Finally, I document that the personal income tax acts as a tax on the vast majority of businesses in the state. Unlike corporations whose net income is taxed at the business-level, nearly 90% of businesses in the state are "pass-throughs," whose income is taxed on the personal returns of the business owners.

2.1 Wisconsin Income Tax and Comparison to Other States

The state of Wisconsin relies heavily on its personal income tax. The Legislative Fiscal Bureau recently announced that in preliminary data on actual collections for fiscal year 2020-2021 the personal income tax brought in $9.28 billion, or more than 47% of the $19.57 billion in total state general fund tax collections (Lang, 2021b). The state income tax is progressive, with statutory marginal tax rates that increase with income. But the tax code has a number of credits and deductions which phase in and out, meaning that the effective rates that taxpayers face may differ quite sharply from statutory rates. In fact, as I show below, under current law families of four with incomes around $50,000 face the highest effective marginal tax rate of 9.83%, more than two percentage points above the statutory 7.65% top rate for the highest earners.

Under the state individual income tax, Wisconsin taxable income is multiplied by the applicable tax rates to arrive at gross tax liability. Currently, the state employs four tax brackets, with a separate tax rate assigned to each bracket. The tax rate structure is cumulative so that each tax rate applies only to income that falls within the corresponding bracket. A taxpayer with income exceeding the threshold for the top bracket would have income subject to each of the four tax rates. The tax brackets vary by filing status and are indexed annually for inflation. Table 1 shows the tax rate schedule for singles and married filing jointly for tax year 2020. The statutory marginal tax rate (MTR) takes one of four values depending on filing status and taxable income. For tax year 2021, the marginal tax rate for the third bracket will fall from 6.27% to 5.3%. (See Guo and Williams (2021a, 2021b).)

Table 1. 2020 Individual Income Tax Rate Schedule

	Taxable Income Brackets ($)	
Marginal Tax Rate (%)	Single	Married Filing Jointly
3.54	0 – 11,970	0 – 15,960
4.65	11,970 – 23,930	15,960 – 31,910
6.27	23,930 – 263,480	31,910 – 351,310
7.65	263,480+	351,310+

As discussed above, the overall tax burden in Wisconsin has fallen slightly in recent years, largely driven by reductions in rates for the lower tax brackets. However, as I discuss in more detail below, most income taxes are paid by higher income filers, and much of the income from these higher income filers consists of pass-through business income. Thus, while the overall tax burden has fallen with modest cuts in *average* tax rates, *marginal* tax rates – which matter for most economic decisions and drive growth impact – have been less impacted.

In fact, Wisconsin's top marginal income tax rate of 7.65% remains one of the highest in the country. As shown in Figure 2, which is taken from Loughead (2021), Wisconsin's top rate is the 9th highest of the 42 states in the US that tax income. Of the states in the Midwest, only Iowa and Minnesota have higher top rates. Apart from those two, most of the high income tax states are on the coasts, led by California, Hawaii, New Jersey, Oregon, and New York (with New York City having an additional progressive city income tax of over 3%). On the flip side, eight states have no income tax at all: Alaska, Florida, Nevada, South Dakota, Tennessee, Texas, Washington, and Wyoming.

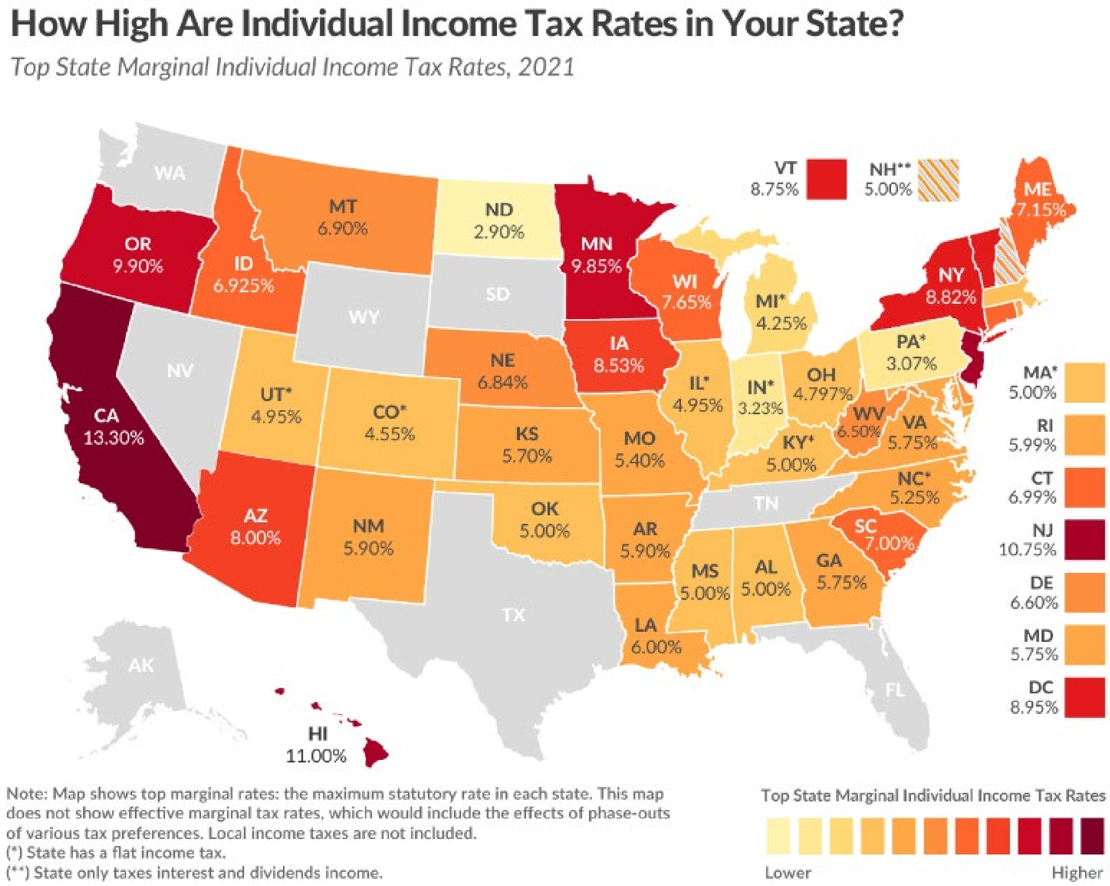

Figure 2: Top state marginal income tax rates across the United States. (Source: Loughead, 2021.)

Of course, the impact of income taxes depends on more than just the statutory tax rates, as the tax code has many exemptions, deductions, and credits. Below I discuss explicit calculations from Guo and Williams (2021) which show effective marginal tax rates for a hypothetical family of four with varying income. Here, to get a broader picture of the distribution of taxes paid and effective tax rates, I use data from Wisconsin Department of Revenue on tax return filings.[1] Table 2 summarizes the data from the 3,132,910 tax returns filed in 2019. I generally refer to the tax filing units as "households," even though they include returns from dependents as well as married couples filing separately.

[1] See https://www.revenue.wi.gov/Pages/RA/Individual-Income-Tax-Statistics.aspx

Table 2: Wisconsin Income Tax Distribution, 2019

Average:	total	Bottom 20 percent	20th to 40th percentile	40th to 60th percentile	60th to 80th percentile	80th to 95th percentile	95th to 99th percentile	top 1 percent
Income per return	$61,105	$1,153	$17,595	$36,108	$63,416	$116,316	$232,143	$1,071,779
Net Tax per return	$2,639	$15	$183	$950	$2,471	$5,521	$12,244	$59,683
Net Tax/ Income	4.32%	1.32%	1.04%	2.63%	3.90%	4.75%	5.27%	5.57%
Marginal rate			1.02%	4.14%	5.57%	5.77%	5.80%	5.65%
Share of income		0.38%	5.76%	11.82%	20.76%	28.55%	15.20%	17.54%
Share of net tax		0.12%	1.39%	7.20%	18.73%	31.39%	18.56%	22.62%

The table shows that the average income of filers was $61,105 and the average (net) tax paid was $2,639, for an average effective income tax rate of 4.32%. However, the total tax revenue from the Department of Revenue distribution table was $8.266 billion, which is substantially less than the $8.759 billion in aggregate 2019 income tax collections in the state reported by the Census Bureau. For comparison with sales taxes, where I only have aggregate values (either reported by the DOR or the Census Bureau), I use the latter collection amount. Using the same 3.132 million filers gives an average income tax payment of $2,796 per filer.

Across the distribution, average effective tax rates increase from 1.3% for the bottom 20% to 5.6% for the top 1%, reflecting the progressive tax structure. Even at the top end of the income distribution, average effective rates are well below statutory marginal rates due to deductions and credits, as well as to the varying rates at which different amounts of income are taxed.

Given the progressive nature of the tax system and the skewed distribution of income in the state, most of the income taxes are paid by higher income filers. In particular, the bottom 40% of filers, with incomes less than $26,600 paid only 1.5% of all state income taxes in 2019, while the top 20% of taxpayers, who had incomes over $85,330, accounted 72.6% of income tax revenue. Further, the distribution of tax returns has more low-income filers than the household income distribution in the state. According to the Census Bureau, the median household income in Wisconsin in 2019 was $64,168 in 2019, slightly higher than both the average income of filers overall and the $63,416 average income of filers 60^{th}-80^{th} percentile range. Filers in that quantile paid an average effective rate of 3.90%, slightly lower than the overall average.

The table also provides a simple calculation of average effective marginal tax rates across the income distribution. For this calculation, I compare the increase in the average tax bill to moving up the reported quantiles of the distribution to the increase in average income. Rather than looking at the true marginal tax rate on the last dollar earned, this gives a measure of the average effective tax rate on incremental income, taking into account that deductions may increase with income. This average marginal rate is also progressive, increasing with income, but the tax schedule both increases and flattens out relatively quickly at around 5.8% for the income groups that account for most of the income taxes that are paid.

2.2 Wisconsin Sales Tax and Comparison to Other States

While in this report I focus on the Wisconsin general sales tax, the state also levies other selective sales taxes, including dedicated taxes on motor fuel, tobacco, alcoholic beverages, and public utilities, among others. Wisconsin first introduced a "sales and use" tax in 1962 at a rate of 3%, but previously the state had employed other specific sales and gross receipts taxes. In 1969 the base of the sales tax was broadened to something close to the current system, and the current 5% tax rate was set in 1982. (Department of Revenue, 2021.)

The general sales tax exempts many categories of purchases. Services are generally exempt from the sales tax, except for a limited number of specified types. Other major exemptions from the general sales tax include (Department of Revenue, 2018):

- Food and food ingredients, except candy, soft drinks, dietary supplements, and prepared food.
- Motor fuels subject to excise taxes.
- Prescription drugs, corrective eye glasses, hearing aids, wheelchairs.
- Purchases by state, local, and federal governments and their agencies.
- Purchases by non-profit hospitals, schools, charitable organizations.
- Manufacturing raw materials.
- Machinery and equipment used exclusively and directly in manufacturing.
- Certain products used in the business of farming, such as seeds, fertilizer, and pesticides.
- Certain vehicles sold to common carriers, such as aircraft, trucks, and trailers.

While the sales tax applies to many business-to-business transactions, both the standard theory of tax incidence and empirical results from historical sales tax changes show that consumers bear the burden of sales taxes (see Poterba (1996), for example).

Figure 3 shows that since the sales tax rate was increased to 5% in 1982, the general sales tax has accounted for roughly 30% of state tax revenue, while total sales taxes have amounted to about 45% of revenue. The right panel of the figure shows that the general sales tax has accounted for about 1.8% of total state personal income over the past decade, down from about 2.2% from the 1980s through the early 2000s.

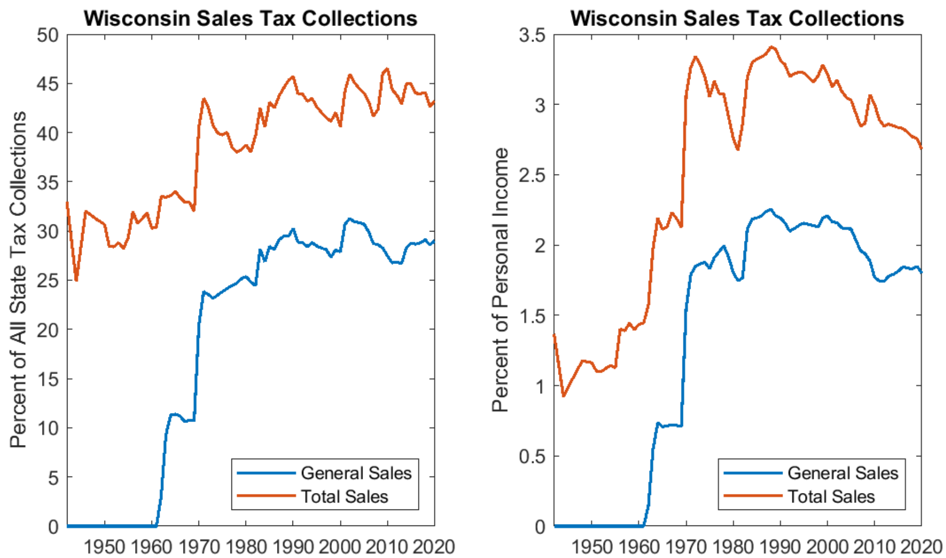

Figure 3: Wisconsin sales tax collections as a percentage of all state tax collections (left panel) and as a percentage of total state personal income (right panel), including state general sales tax (blue) and total sales taxes (red), which include selective sales.

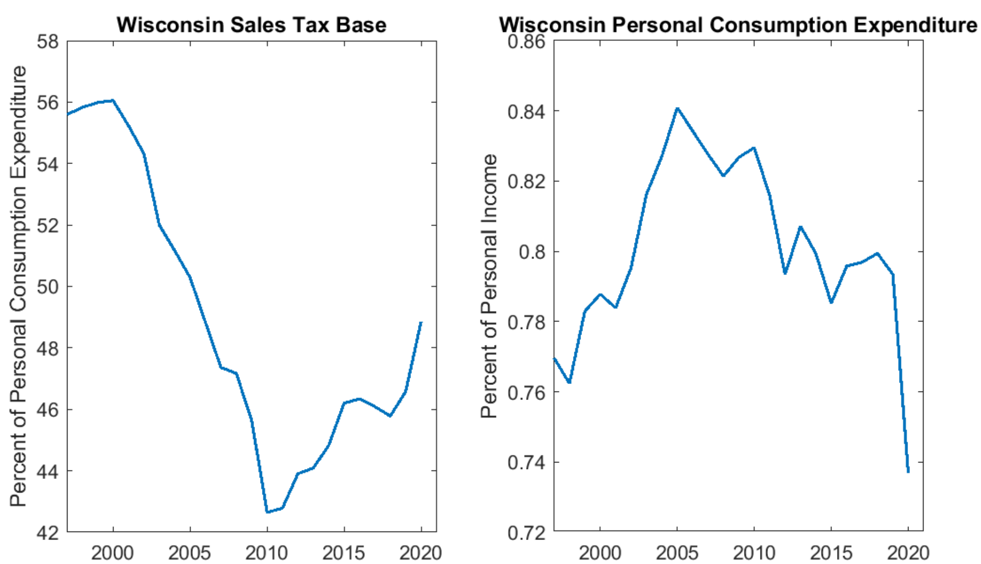

Figure 4: Wisconsin general sales tax base as a percentage of personal consumption expenditure (left panel), and Wisconsin personal consumption percentage of total state personal income (right panel).

Changes over time in sales tax revenue are driven both by changes in the level of consumption, as well as shifts in consumption between taxable and exempt goods. The left panel of Figure 4 plots the implied Wisconsin sales tax base (sales tax revenue divided by 5%) as a percentage of state personal consumption expenditure. Here I make the standard incidence assumption that sales taxes levied on business purchases are passed on to Wisconsin consumers.[2] The figure shows a large decline in the taxable share of consumption from 56% in 2000 to less than 43% in 2010. This was driven both by a shift from consumption of goods to consumption of services (which are generally exempt from the sale tax), as well as growth in online sales, which were largely untaxed prior to the Wayfair decision in 2018. Since 2010, the taxable share of consumption has increased, hitting nearly 49% in 2020 due to increased goods consumption during the pandemic.

The right panel of Figure 4 shows personal consumption expenditure as a percentage of personal income in Wisconsin. Here we see that the consumption share of income fell from 84% in 2005 to around 79% over the past decade. The declining consumption share of income reconciles the fact that while the taxable share of consumption has risen in recent years, sales taxes as a share of income has been relatively stable over the past decade. In the pandemic year of 2020, personal income increased (largely due to fiscal transfers) while personal consumption fell (especially in services), so the consumption share of income dropped by 6 percentage points. More recent data has shown both a reduction in transfers and a rebound in consumption, so the large drop and low share of income consumed in 2020 was likely an anomaly.

To compare magnitudes of the sales and income taxes, I use 2019 data to be consistent with the income tax data above. According to the Census Bureau, Wisconsin state general sales tax revenue in 2019 totaled $5.695 billion. Dividing by the state population of 5.822 million gives per capita sales taxes of $978, while using the 3.132 million tax filers as the base gives $1,818 in sales taxes for an average household (tax unit). This latter number compares to the $2,796 in income taxes per household.

In addition to the statewide general sales tax, Wisconsin state law allows counties to impose an additional 0.5% local sales tax. Currently, 68 of the state's 72 counties do so. Nonetheless, the combined state and local sales tax rates in Wisconsin put the state on the lower end of the national distribution. According to the Tax Foundation (Cammenga, 2021), Wisconsin's state sales tax rate of 5% puts the state 33rd highest of the 45 states with a sales tax. But including the comparatively low local taxes, Wisconsin's combined state and local sales tax rate of 5.43% is 43rd highest, or third lowest of the states that have a state sales tax. The distribution of combined sales tax rates is shown in Figure 5, from Cammenga (2021). By comparison, Missouri's state sales tax rate is lower than Wisconsin at 4.225%, but its local sales taxes average over 4%, so the combined state and local rate is 8.25%.

In broad terms, this section and the previous one document that Wisconsin has a relatively high state income tax rate, particularly at the top end, and a comparatively low state sales tax rate,

[2] This calculation also implicitly assumes that all sales taxes in the state fall on domestic consumers, but some Wisconsin consumers make purchases out-of-state, and some out-of-state consumers pay Wisconsin sales tax when they make purchases in the state. I assume these net out.

particularly when accounting for combined state and local rates. I next turn to additional distorting features of the state income tax.

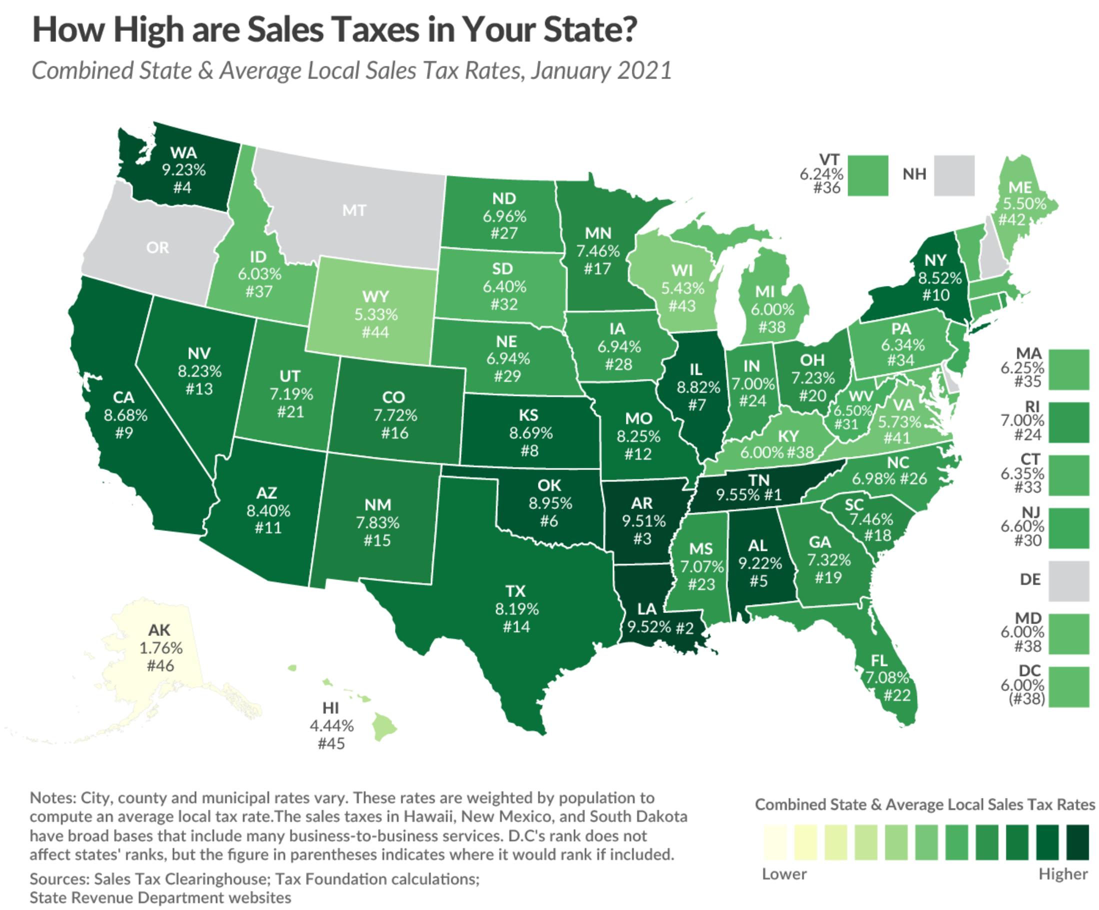

Figure 5: Combined state and local sales taxes across the United States. (Source: Cammenga, 2021.)

2.3 Middle Income Households in Wisconsin Face the Highest Effective Marginal Income Tax Rates

In this section, which summarizes results in Guo and Williams (2021a), I delve deeper into the details of the Wisconsin state income tax code. In addition to the statutory marginal tax rates (MTRs), the tax code contains a host of deductions and credits, many of which have different income thresholds and phase-out schemes. Accounting for all of these features, I illustrate how tax credits and deductions lead the effective MTR to differ, in some cases quite sharply, from statutory tax rates. I focus on a married couple with two children that files jointly, but the results are similar (with different income cutoffs) for other taxpayers.

While the statutory MTR is the derivative/slope of *gross* tax liability with respect to *taxable* income, the effective MTR is the derivative/slope of *net* tax with respect to Wisconsin adjusted *gross* income (WAGI). As the base for state individual income tax, WAGI is gross income adjusted for income and expenses exempt from state individual income tax. Taxable income is determined by subtracting the standard deduction and personal exemptions from WAGI. As mentioned above, taxable income is multiplied by the applicable tax rates to arrive at gross tax liability. Finally, net tax liability is determined by subtracting nonrefundable and refundable tax credits from gross tax liability. Consequently, changes in deductions and tax credits affect the effective MTR even if the statutory MTR remains unchanged.

Beyond the statutory marginal tax rates, the key features affecting the net tax liability of a married couple in Wisconsin are the state earned income tax credit (EITC), the married couple credit, and the standard deduction, which unlike in the federal tax code phases out at higher income levels. I vary the income of this illustrative household, computing the net tax (after deductions and credits) as a function of WAGI. The effective MTR, defined as the slope of the net tax curve, is shown in Figure 6. For comparison, Figure 6 also plots the statutory MTR as a function of WAGI.

As the figure shows, this effective MTR is very complex. For WAGI below $14,800, the net tax is negative and decreases at a rate of 4.4%, implying an effective MTR of -4.4%. This happens because (1) there is no tax liability due to personal exemptions and the standard deduction, and (2) Each additional dollar of WAGI raises disposable income by $1.044 with the 4.4 cents coming from the state EITC.

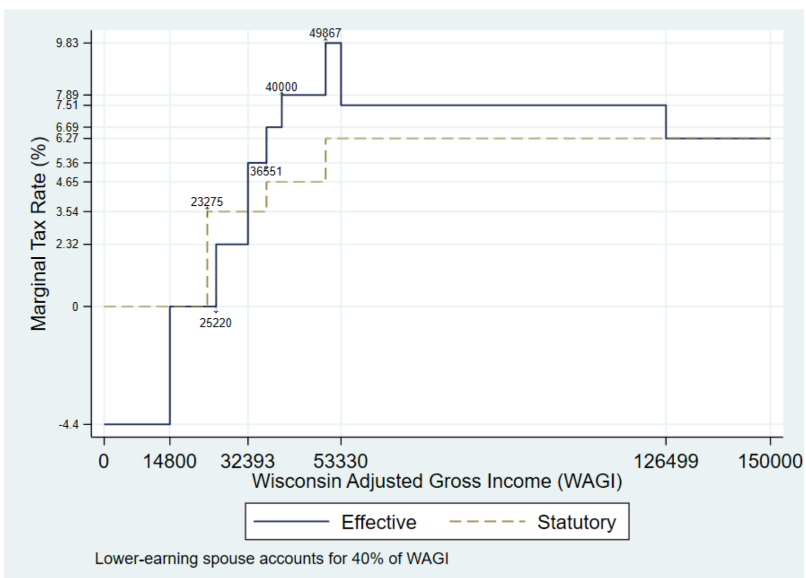

Figure 6: The effective marginal income tax rate and statutory tax rate for a married couple with two children filing jointly.

For WAGI between $14,800 and $25,220, the net tax is flat at -$651 because of state EITC, and the effective MTR is zero. Although the statutory rate jumps from zero to 3.54% by the end of this phase, it's not effective yet because the resulting gross tax is less than the married couple credit.

For WAGI between $25,220 and $32,393, the effective MTR is 2.32%, the rate at which state EITC phases out. The net tax starts to increase but remains negative. The statutory rate of 3.54% is still ineffective because of the married couple credit.

For WAGI between $32,393 and $36,551, the effective MTR is about 5.36%. The statutory rate of 3.54% is finally effective. The phase-out of the standard deduction raises the rate to about 4.24%. The phase-in of the married couple credit brings it down to about 3.04%. Finally, the phase-out of state EITC raises it to 5.36%. The net tax is still negative.

For WAGI between $36,551 and $40,000, the effective MTR is about 6.69%. Relative to the previous phase, the statutory rate increases from 3.54% to 4.65%. The phase-out of the standard deduction raises the rate to about 5.57%. The phase-in of the married couple credit brings it down to about 4.37%. Finally, the phase-out of state EITC raises it to about 6.69%.

For WAGI between $40,000 and $49,867, the effective MTR is about 7.89%, 1.2 percentage points higher than the last phase because the married couple credit is now flat. Specifically, the statutory rate is still 4.65%. The phase-out of the standard deduction raises the rate to about 5.57%, and the phase-out of state EITC raises it further to about 7.89%. The net tax turns positive for WAGI above $40,402.

For WAGI between $49,867 and $53,330, the effective MTR reaches its highest level of about 9.83%. Relative to the last phase, the statutory rate increases to 6.27%. The phase-out of the standard deduction raises the rate to about 7.51%, and the phase-out of state EITC raises it further to about 9.83%.

For WAGI between $53,330 and $126,499, the effective MTR is about 7.51%, 2.32 percentage points lower than the previous phase because the state EITC now exhausts. The statutory rate is 6.27%, and the phase-out of the standard deduction raises the effective rate to about 7.51%,

Finally, for WAGI above $126,499, the standard deduction phases out completely, and the effective MTR is now equal to the statutory rate, which is equal to 6.27% for WAGI below $150,000.

In summary, the phase-in of tax credits reduces the effective marginal tax rate, while the phase-out of both the standard deduction and the tax credits raises the effective rate. Overall, the effective MTR is smaller than the statutory rate for WAGI below $32,393, and it is larger for WAGI between $32,393 and $126,449. In particular, for WAGI between $40,000 and $53,330, the statutory rate is 6.27% or less while the effective MTR is greater than 7.89%, and peaks at 9.83%. These are highest effective marginal tax rates across the entire income distribution.

Thus, even though Wisconsin's statutory tax rates are progressive and increase with income, accounting for phase-outs of deductions and credits means that households below the state median income pay the highest effective marginal tax rates.

2.4 The Wisconsin Income Tax Hits Pass-Through Businesses and is Compounded by the Federal Income Tax

I now turn to an important feature of the income tax code that is crucial for measuring the economic impact of taxation: a large share of businesses pay the individual income tax. In particular, the legal form of a business determines how the net income of the business is taxed. C-corporations, which are typically larger and often multi-state or multi-national operations, pay the corporate income tax on their net income. In addition to the federal corporate tax of 21%, corporations in Wisconsin pay a state corporate tax rate of 7.9%. However, the vast majority of businesses are "pass-through" businesses, where the income of the business "passes through" to the tax returns of the business owners. Pass-throughs include sole proprietorships, partnerships, and S-corporations. Such businesses are typically smaller than corporations, and often serve more limited, local markets. Moreover, while we've seen above that higher income filers pay most of the state income tax, a large share of their income is business income. In summary, the Wisconsin personal income tax serves as a tax on business activity in the state, with most of these businesses facing the top marginal tax rate of 7.65%.

Table 3: Distribution of Employment and Establishments Across Legal Forms in Wisconsin, 2018

	Total	Corporate	Pass Through	Government & Non-Profit
Employment (CBP + NES)	2,957,314	1,020,397	1,504,844	432,073
Employment Share	--	34.50%	50.89%	14.61%
Establishments (CBP + NES)	496,832	38,663	443,622	14,547
Share of Establishments	--	7.78%	89.29%	2.93%
Employees per Establishment	5.95	26.39	3.39	29.70
Employment (CBP)	2,602,148	1,016,964	1,153,111	432,073
Establishments (CBP)	141,666	35,230	91,889	14,547
Employees per Establishment	18.37	28.87	12.55	29.70

Table 3 presents results on the distribution of employment and establishments across legal forms in Wisconsin in 2018, the latest year that full data are available. The table combines results from two Census Bureau data sets, County Business Patterns and Nonemployer Statistics. I report the legal forms in three groups: corporate, pass through, and government and nonprofit (which also includes those categorized as "other"). The top rows focus on the combined data sets, to get a full sense of overall employment, while the bottom includes only the CBP. These rows thus exclude the self-employed to get a better sense of the typical establishment size for employers of different legal forms.

The table shows that 50.9% of all employment in Wisconsin in 2018 was at pass-through businesses who pay taxes at the individual rate. Including the self-employed, 89.3% of all businesses in Wisconsin were pass-throughs. By contrast, C-corporations accounted for 34.5% of employment but only 7.8% of establishments. C-corporations tend to be larger than pass-throughs, with 26.4 workers per establishment or 28.9 when excluding incorporated non-employers. Pass-throughs tend to be small: there were 351,733 pass-through businesses without employees, bringing the average number of employees per pass-through establishment down to only 3.4. But even pass-throughs with employees are smaller. Excluding the self-employed increases the number of employees per pass-through establishment only to 12.6, which is less than half the size of a typical corporate establishment. So, in summary, the majority of employment and the vast majority of businesses in Wisconsin pay taxes at the personal rate, and these businesses are typically small.

Table 4: Federal Income Tax Distribution in Wisconsin, 2018

Item	All returns	Size of adjusted gross income									
		Under $1	$1 under $10,000	$10,000 under $25,000	$25,000 under $50,000	$50,000 under $75,000	$75,000 under $100,000	$100,000 under $200,000	$200,000 under $500,000	$500,000 under $1 million	$1 million or more
Number of returns	2,875,130	34,180	374,860	506,600	700,170	435,300	296,870	413,570	92,870	14,250	6,460
Adjusted gross income	196,740	-2,618	1,887	8,719	25,671	26,809	25,775	55,097	26,320	588,862	19,491
AGI per return	68,428	-76,604	5,033	17,211	36,665	61,588	86,823	133,222	283,412	672,903	3,017,195
Partnership/S-corp net income: Number	148,410	5,780	3,730	8,170	15,830	16,670	16,800	41,580	27,050	7,830	4,980
Amount	11,866	-618	-8	14	82	1334	172	1,001	2,321	1,904	6,862
Business or profession net income: Number	357,650	11,010	30,940	57,320	65,310	54,210	43,870	69,540	20,200	3,530	1,730
Amount	4,845	-132	95	462	623	585	551	1,277	961	274	149
Total pass through income	16,711	-750	87	476	705	719	723	2,278	3,282	2,178	7,011
Pass through income per return	5,812	-21,944	233	940	1,008	1,652	2,435	5,508	35,343	152,855	1,085,337
Share of AGI	8.49%	28.65%	4.62%	5.46%	2.75%	2.68%	2.80%	4.13%	12.47%	22.72%	35.97%
Total tax liability	23,927	15	22	245	1,424	2,030	2,117	6,111	4,512	2,283	5,168
Tax/return	8,322	431	58	483	2,034	4,663	7,132	14,776	48,585	160,234	800,015
Tax/AGI	12.16%		1.16%	2.81%	5.55%	7.57%	8.21%	11.09%	17.14%	23.81%	26.52%
Avg marginal rate				3.49%	7.97%	10.55%	9.79%	16.47%	22.51%	28.67%	27.29%
share of total AGI			0.96%	4.43%	13.05%	13.63%	13.10%	28.00%	13.38%	4.87%	9.91%
share of total tax			0.09%	1.02%	5.95%	8.48%	8.85%	25.54%	18.86%	9.54%	21.60%

Source: IRS Statistics of Income. Aggregate dollar amounts in millions.

Table 4 summarizes the distribution of ownership of pass-through businesses in Wisconsin, which is useful for both understanding its concentration and also the effective taxes that such businesses face. The table summarizes data from the IRS Statistics of Income for 2018, which is drawn from the federal tax return filings of Wisconsin residents. The data coverage thus differs from the employment data in Table 3, as Table 4 is based on the residence of owners rather than the location of employers. The table shows that 357,650 households in Wisconsin reported business income, with an additional 148,410 reporting partnership or S-corporation net income. Adding these categories would include some double counting, as some filers had income of both types. Nonetheless, these numbers are comparable to the establishment data above.

The table shows that although many filers across the income distribution claimed at least some pass-through income, most of pass-through business income is concentrated among higher income filers. In particular, 74.6% of pass-through business income in 2018 in Wisconsin was claimed on tax returns with $200,000 or more in income. The table also shows that overall, 8.5% of total federal adjusted gross income in the state consisted of pass though business income, for an average of $5,812 per return. But that business income was concentrated among higher incomes, as well as very low (and negative) incomes, which often result from reported business losses. Among the filers reporting more than $1 million in income, pass-through income accounted for 36% of their total income. Although I do not have state-level tax data broken down by income source, it is thus likely that the majority of pass-through income is taxed at the top state marginal income tax rate of 7.65%.

Further, while I focus in this report on the state income tax, it is important to recognize that the state income tax sits on top of the federal income tax. Thus, the distortions generated by the state income tax are compounded, since the state income tax affects margins which are already distorted by federal taxes. As shown by Watson (2020), when combining state and federal tax rates, pass-through businesses in Wisconsin face a top marginal tax rate of 47.7%, the 12th highest rate among states in the US.

The bottom rows of Table 4 provide the distribution of federal income taxes and rates in Wisconsin, similar to the state income tax distribution in Table 2 above. On average, Wisconsin filers paid $8,322 in federal income taxes at an average effective rate of 12.2%. As with state income taxes, the federal income tax is progressive, with higher income filers paying higher average and marginal tax rates. The average effective rates top out around 27% and average marginal rates (computed as above as the incremental tax over the incremental income across groups) hit over 28%. Further, while the average marginal state income tax rates are flat for much of the income distribution, federal marginal rates increase more sharply and only flatten out at the very high end of the income distribution. As with state taxes, the progressive tax structure and the skewed income distribution mean that most federal income taxes are paid by high income filers. Half of all federal income taxes paid in Wisconsin come from filers with incomes of over $200,000, and more than 75% comes from incomes over $100,000.

3. The Model

I now turn to the model that I use to evaluate the economic impact of state tax reform. As discussed above, to appropriately consider the behavioral and dynamic effects of fundamental tax reform requires a dynamic model. To evaluate the impact of any policy, we need a counterfactual to know what would happen with and without the policy change. For a fundamental policy change of the type considered here, with large changes in tax rates which are outside of historical experience in the state, we cannot readily rely on empirical extrapolations from past tax changes. Thus, as is standard in dynamic macroeconomic policy analysis, I develop a structural model of the state, which I take to be a version of a standard small open economy model, and calibrate the parameters of the model to match observed economic outcomes in the state under current law. Then I vary the tax policies and simulate the model economy to predict the equilibrium economic impact of the tax reform.

3.1 Dynamic Evaluation of Tax Policy and Related Work

"Dynamic scoring" approaches to tax policy evaluation have long been the standard approach in the academic literature and are now common in the evaluation of federal policy as well. Congressional bills and federal policy proposals are now regularly evaluated based on their dynamic impact on the economy, accounting for behavioral responses and economic feedbacks. This is true both of government sources, such as the Congressional Budget Office and the Joint Committee on Taxation, as well as private policy analyses, such as the Tax Foundation and the Penn Wharton Budget Model. See, for example, Mankiw and Weinzerl (2006), Gravelle (2014), and Auerbach and Grinberg (2017) for discussions of the issues and approaches to dynamic scoring. But while such evaluations are commonplace for federal policy, there have been few applications of dynamic tax policy evaluation at the state level, and in particular none for the state of Wisconsin.

A dynamic evaluation is crucial because changes in tax policy affect behavior in ways that have both static and dynamic economic feedbacks. Within a period, a lower income tax increases labor supply by increasing after-tax wages, and a lower cost of capital on businesses encourages investment. An increase in the sales tax also favors saving over spending out of current income. But over time, with higher employment and capital, output and incomes will grow. As people have more income, consumption will increase. All of these factors in turn affect economic output, incomes, and employment, as well as tax revenue.

The paper closest to mine is by Hendrickson and Mau (2021), who analyze a similar plan to eliminate the income tax in the state of Mississippi. However, our models and analyses differ in some crucial ways. They consider a standard neoclassical growth model, along the lines of Prescott (2004), who analyzed the impact of taxation in Europe relative to the United States. By contrast, I use a small open economy version of standard neoclassical growth model, as in Schmitt-Grohé, and Uribe (2003, 2017). That is, the state of Wisconsin trades with the rest of the US and indeed the world, with capital flowing across state lines, but the interest rate is set on national (or global) markets. Related small open economy models of state economies have been studied by Beraja, Hurst, and Ospina (2019) and Nakamura and Steinsson (2014).

In addition, relative to Hendrickson and Mau (2021), my model has two other features which are crucial for evaluating the impact of state taxes. First, I model more explicitly the state tax structure and its interaction with federal taxes. As discussed above, state taxes in Wisconsin are progressive, and are layered on top of progressive federal income taxes. In practice, this means that agents in the model face higher effective marginal tax rates (with deductions and exemptions so average rates are lower than the marginal rates). This also makes the state income tax more costly, since it operates on margins which are already distorted by the federal income tax. Additionally, federal government expenditures in the state need not match federal tax revenue raised in the state, and in fact Wisconsin has been receiving net federal transfers for the last several years. Finally, I account for the fact that a significant portion of federal government outlays are not government spending ("*G*") in the usual national accounts sense, but instead are government transfer payments. I model this by having a fraction of federal revenue rebated to households in a lump sum fashion.

Further, my model includes the fact that the income tax hits the profits of pass-through businesses, as documented above. Thus, the income tax acts as a tax on some business capital, and eliminating the income tax reduces the cost of capital for pass-through businesses. I model different business legal forms in a very simple way: I suppose that the tax on businesses is a weighted average of the combined federal and state corporate tax rate and personal income tax rate, with governments and nonprofits being tax exempt. Corporate profits are taxed again as income when rebated to households, while pass-through profits are taxed only once. This aggregation approach allows me to work with a standard growth model, rather than developing a model with heterogeneous firm types. But it misses some potentially important impacts of the tax reform. I likely understate the growth impact of the reform by analyzing the response to the change in average taxes as opposed to averaging the response to taxes. That is, pass-through businesses would likely expand production more than the model suggests. By fixing the shares of production, I also rule out any shifts in legal form after the reform, such as corporations becoming pass-throughs in response to their more favorable tax treatment. This is likely not a major omission, as many of the major corporate employers in the state are national or multi-national corporations, and would not be likely to change their legal form in response to taxes in one state.

3.2 The Model

Now I formally lay out the model, starting with households, then turning to firms, and finally to the federal and state governments. The model is a modification of Schmitt-Grohé and Uribe (2003, 2017) to include proportional taxes from two layers of governments. I focus on a deterministic, perfect-foresight model without trend growth, so add back trends when taking implications from the model to the data.

The representative household maximizes utility over the infinite horizon with discount factor $0<\beta<1$. The household receives a positive utility flow from consumption c and a negative flow from labor hours h in each period. Thus, the household's objective is:

$$\sum_{t=0}^{\infty} \beta^t u(c_t, h_t).$$

I assume period preferences are of Greenwood, Hercovitz, and Huffman (1988) type:

$$u(c,h) = \frac{\left(c - \frac{h^\omega}{\omega}\right)^{1-\sigma} - 1}{1-\sigma}.$$

As discussed in Schmitt-Grohé and Uribe (2017), this specification is commonly used in small open economy models, and results in a simple labor supply curve with elasticity $1/(\omega - 1)$, which is independent of income. The household owns shares s_t in the productive firms and borrows an amount d_t at the interest rate r_t. The household faces progressive state and federal taxes on income, as well as the state sales tax on (a portion of) its consumption. Further, the household receives lump sum government transfers in amount T_t. The household's budget constraint can be written as a law of motion for its stock of debt d_t:

$$d_t = d_{t-1} + (1 + \tau_{c,t})c_t + p_t(s_t - s_{t-1}) - \mathrm{T}_t - \rho_t\,(w_t h_t + s_{t-1}\pi_t - r_{t-1}\,d_{t-1}), \tag{3.1}$$

where $\tau_{c,t}$ is the (effective) state sales tax, p_t is the price of shares in the firm, w_t the wage, and π_t firm profits. I abstract from capital gains taxes because in equilibrium no shares are traded. Here $\rho_t(x)$ gives after-tax income, i.e. $\rho(x) = x - \tau(x)$ for some income tax function $\tau(x)$. Note that, as in the tax code, the income tax applies to both labor and capital income, and here it combines state and federal income taxes.

As noted above, both state and federal taxes are progressive, which means the tax function is piecewise linear. For example, with two tax brackets (and no exemptions or deductions), the tax function could be written:

$$\tau(x) = \begin{cases} \tau_L x, & x < \bar{x} \\ \tau_L \bar{x} + \tau_H(x - \bar{x}), & x \geq \bar{x} \end{cases}$$

with marginal tax rates $\tau_L < \tau_H$ and bracket threshold $\bar{x}$. Working with a representative household within a single bracket, this means that the household effectively faces an affine income tax function. Thus, I assume:

$$\rho_t(x) = x - \tau_{y,t}(x - \gamma),$$

where $\tau_{y,t}$ is the effective marginal income tax rate at date t and γ captures deductions, exemptions, and income taxed at sub-marginal tax rates. Note that $\rho_t{}'(x) = 1 - \tau_{y,t}$ gives marginal after-tax income, and we can further decompose the marginal tax rate into the sum of the federal and state tax marginal income rates: $\tau_{y,t} = \tau^f_{y,} + \tau^s_{y,t}$. In the tax reforms below, I keep federal tax rates constant but vary state rates.

The household chooses consumption, hours worked, and asset purchases to maximize utility subject to the budget constraint (3.1). Letting λ_t denote the Lagrange multiplier on the budget constraint, we get the optimality conditions:

$$\lambda_t = \beta\lambda_{t+1}\big(1 + (1 - \tau_{y,t})r_t\big),$$

$$u_c(c_t, h_t) = \lambda_t(1 + \tau_{c,t}),$$

$$-u_h(c_t, h_t) = \lambda_t w_t(1 - \tau_{y,t}),$$

$$\lambda_t p_t = \beta\lambda_{t+1}\big(p_{t+1} + (1 - \tau_{y,t+1})\pi_{t+1}\big).$$

Combining the optimality conditions for consumption and hours, and using the functional form of utility, gives us the labor supply relation:

$$(3.2) \qquad -\frac{u_h(c_t, h_t)}{u_c(c_t, h_t)} = h_t{}^{\omega-1} = \frac{(1 - \tau_{y,t})}{(1 + \tau_{c,t})} w_t.$$

Thus, the labor supply elasticity is given by $1/(\omega - 1)$, and we see that labor supply is impacted by both income taxes and sales taxes.

To consider firms with different legal forms, I assume that a fraction θ_f of firms are C-corporations, θ_p are pass-throughs, and θ_g are non-profits and government. All types produce with a common constant returns to scale production function $F(k, h)$ and which I assume takes the standard Cobb-Douglas form. Each type of firm i faces a different tax τ_i on its net income, which I take to be output minus the wage bill and a depreciation allowance with rate δ. Thus letting i_t be investment, the after-tax profit $\pi_{i,t}$ of a firm can be written:

$$\pi_{i,t} = F(k_{i.t}, h_{i.t}) - w_t h_{i,t} - i_{i.t} - \tau_{i,t}\big(F(k_{i,t}, h_{i,t}) - w_t h_{i.t} - \delta k_{i,t}\big),$$

C-corporations face the combined federal and state corporate tax which I denote τ_f, pass-throughs face the personal income tax rate τ_p and non-profits are not taxed. As discussed above, the ownership of pass-through businesses is particularly concentrated among higher income earners, so I allow the marginal tax rate on pass-through income to differ from the average marginal tax rate from other sources of income.

In general, firms of different types facing different tax rates will choose different levels of capital and labor. But since I assume that the firms hire in a common labor market, they would equate capital-labor ratios. In order to preserve simple aggregation, as discussed above I assume that the shares of the different types are fixed over time. This means we can write $k_{i.t} = \theta_i k_t$ and $h_{i.t} = \theta_i h_t$, and thus write the aggregate after-tax profit as:

$$\pi_t = \sum_i \pi_{i,t} = F(k_t, h_t) - w_t h_t - i_t - \left(\sum_i \theta_i \tau_{i,t}\right)(F(k_t, h_t) - w_t h_t - \delta k_t),$$

Thus, I have effectively assumed an aggregate firm made up of different types of legal forms, which faces the weighted average tax rate on its profits, which I denote $\bar{\tau}_f = \theta_c \tau_f + \theta_p \tau_p$. The law of motion for capital is standard:

$$k_{t+1} = (1-\delta)k_t + i_t.$$

Firms are owned by households, so over time profits are weighed by their marginal contribution to the household wealth (or relaxing the household budget constraint). That is, given current capital k_t, firms choose hiring h_t and investment i_t (or equivalently, next period's capital k_{t+1}) to maximize discounted profits:

$$\sum_{t=0}^{\infty} \beta^t \lambda_t \pi_t \,.$$

The firm's optimality conditions are:

$$\lambda_t = \beta \lambda_{t+1} \Big(\big(1 - \bar{\tau}_{f,t+1}\big) F_k(k_{t+1}, h_{t+1}) + 1 - \delta + \delta \bar{\tau}_{f,t+1} \Big),$$

$$F_h(k_t, h_t) = w_t.$$

Note as well that only corporate profits are taxed again as income at the household level, as I have assumed that pass-through profits are taxed under the personal income tax at the business level. Thus, the income tax function defined above can be written explicitly as:

$$\begin{aligned} \rho_t\,(w_t h_t + s_{t-1}\pi_t - r_{t-1}\,d_{t-1}) \\ = w_t h_t + s_{t-1}\pi_t - r_{t-1} d_{t-1} - \tau_{y,t}(w_t h_t + \theta_c s_{t-1}\pi_t - r_{t-1} d_{t-1} - \gamma). \end{aligned}$$

I now turn to the state and federal governments. First, the state government, which is my focus, sets its marginal income tax rate $\tau_{y,t}^s$ and exemption γ_s, corporate tax rate $\tau_{f,t}^s$, tax on pass-throughs $\tau_{p,t}^s$, and sales tax $\tau_{c,t}$. The state balances its budget, so total outlays on government consumption G_t^s and transfers T_t^s each period must equal total revenue:

$$\begin{aligned} G_t^s + T_t^s = \; & \tau_{p,t}^s \theta_p (F(k_t, h_t) - w_t h_t - \delta k_t) + \tau_{y,t}^s (w_t h_t + \theta_c \pi_t - r_{t-1} d_{t-1} - \gamma_s) \\ & + \tau_{f,t}^s \theta_c (F(k_t, h_t) - w_t h_t - \delta k_t) + \tau_{c,t} c_t. \end{aligned}$$

The first two terms on the right side of the equation represent total state income tax revenue, giving taxes on pass-through income plus taxes on regular income (net of deductions and exemptions).

The federal government also raises revenue from income taxes, by setting a marginal income tax rate $\tau_{y,t}^f$ and exemption γ_f, corporate tax rate $\tau_{f,t}^f$, and tax on pass-throughs $\tau_{p,t}^f$. But the federal government need not balance its budget each period, or even more importantly here, need not balance spending in the state, composed of consumption G_t^f and transfers T_t^f, with revenue raised in the state. That is, the federal government can provide net transfers to the state, which I denote M_t^f. (This amount could be negative, but in the case of Wisconsin it has been positive in recent years.) Thus, total resources available for the federal government in the state consist of revenue raised and net inflows of funds:

$$G_t^f + T_t^f = \tau_p^f \theta_p (F(k_t, h_t) - w_t h_t - \delta k_t) + \tau_y^f (w_t h_t + \theta_c \pi_t - r_{t-1} d_{t-1} - \gamma_f) + \tau_f^f \theta_c (F(k_t, h_t) - w_t h_t - \delta k_t) + M_t^f.$$

I denote the total federal tax revenue raised in the state (all terms on the right side of the equation except M_t^f) as REV_t^f.

I assume that both federal and state government consumption (G_t^f, G_t^s) are not directly valued by households and do not affect production. Under this assumption, which is common in the literature, government consumption (but not transfers) is a pure loss of resources, and thus this is not a model of the optimal level of spending or taxation (which would be zero). Rather, the model analyzes alternative funding sources for a given stream of government consumption. Little would change if in the model households valued government consumption separably from private consumption. If government consumption substituted (even imperfectly) from private consumption or private output, then there would be a wealth effect from changes in government consumption which may dampen some of the impacts that I find.

Since this is a small open economy, the interest rate r_t is exogenous to the state, being determined on national and global markets. The rest of the equilibrium in this environment is standard: given interest rates, as well as sequences of government tax, transfer, and spending policies, households maximize utility, firms maximize profits, and markets clear. Firm shares are in unit net supply, so in equilibrium s_t is identically equal to one, and there is no trading in shares. Thus, given profits, the household optimality condition for share purchases simply pins down the share price p_t. Labor market equilibrium combines the labor supply relation from equation (3.2) with the labor demand condition that the firm hires until the marginal product of labor is equal to the wage:

$$h_t^{\omega-1} = \frac{(1-\tau_{y,t})}{(1+\tau_{c,t})} F_h(k_t, h_t).$$

The household optimality condition for borrowing and the firm optimality condition for investment then imply that the after-tax interest rate is equated to the after-tax marginal product of capital:

$$(1-\tau_{y,t}) r_t = (1-\bar{\tau}_{f,t+1})(F_k(k_{t+1}, h_{t+1}) - \delta).$$

Since the state is a small open economy, the household budget constraint (3.1) in equilibrium simply determines the current account balance as the change in household borrowing: $CA_t = d_{t-1} - d_t$. Further, the state's balance of trade, defined as $TB_t = CA_t + r_{t-1} d_{t-1}$, satisfies the usual goods market equilibrium condition, adjusted for the net inflows from the federal government:

$$TB_t = F(k_t, h_t) - c_t - i_t - G_t^f - G_t^s + M_t^f.$$

Thus, for a given set of government policies, we can compute the perfect foresight equilibrium to determine all of the key outcomes for the state economy, such as output, employment, consumption, as well as tax revenue.

3.3 Calibration

I now discuss the parameterization and calibration of the model, using standard functional forms and choosing the parameters of those functional forms to match key indicators for the Wisconsin economy under current law. Later I vary the parameters of the state government policy to analyze the proposed tax reform.

My calibration approach, like that in Hendrickson and Mau (2021), assumes that the state economy was in a steady state prior to the COVID-19 pandemic which hit in early 2020. A common approach to calibrating growth models is to take long-run averages over long spans. But several of the key parameters in my specification are components of policy rules, such as tax rates, which have changed substantially over time. In particular, the 2017 federal tax reform dramatically cut the statutory federal corporate tax rate, so setting the effective corporate tax rate in my model based on early data would not necessarily characterize the current environment or provide a useful benchmark for the future. For some relationships which have proven more stable, such as the ratio of sales tax revenue to consumption, I take averages over a decade or more, but for others, like effective marginal tax rates, I focus on recent data.

For the interest rate, I follow a modification of the approach in Schmitt-Grohé and Uribe (2003), adjusted for taxes. I assume that the interest rate r_t is state-specific, embodying a risk premium $p(d_t)$ that depends on the level of borrowing in the state. This mechanism ensures that there is a unique steady state in the economy, independent of initial conditions. I assume that out-of-state investors can obtain a pre-tax rate of return r^* on their assets and face the federal income tax on their interest earnings (for example, their marginal investments are in states without a state income tax). Free capital inflows then ensure that the after-tax, risk-adjusted returns are equated:

$$\left(1-\tau_y^f-\tau_{y,t}^s\right)r_t = \left(1-\tau_y^f\right)\left(r^*+p(d_t)\right).$$

As in Schmitt-Grohé and Uribe (2003), I parameterize $p(d_t) = \psi\left(\exp\left(d_t-\bar{d}\right)-1\right)$, where $\bar{d}$ is the steady state level of borrowing, and I set $\psi = 0.01$. Thus the state-specific risk premium is small and vanishes in the steady state. As in Barro and Furman (2018), I set $r^* = 0.04$, which is a standard interest rate value between measured returns on capital and bonds. Note as well that reductions in state income taxes $\tau_{y,t}^s$ reduce the required rate of return and lead to an inflow of capital.

I have already specified that the household has GHH preferences, and I set the labor supply elasticity to 1, which implies a value of $\omega = 2$, and the consumption preference parameter to $\sigma = 1$, which implies log utility. Log utility, and thus a unit intertemporal elasticity of substitution, is standard in the literature. Unit aggregate labor supply elasticities are common in the macro literature, such as Prescott (2004), although most microeconomic studies estimate lower labor supply elasticities. But Keane and Rogerson (2012) and Chetty et al. (2011) discuss how aggregate elasticities capture different adjustment margins, and so small micro elasticities are consistent with large aggregate elasticities. Since mine is a statewide aggregate model, interstate mobility provides another margin of adjustment, strengthening the case for a larger elasticity. I set the preference discount factor to $\beta = 1/\left(1 + \left(1 - \tau_y^f\right) r^*\right)$, which is a common assumption modified for taxation.

The production function is a standard Cobb-Douglas specification: $F(k, h) = Ak^\alpha h^{1-\alpha}$, where labor's share of income is $1 - \alpha$. Since I consider a stationary model, the productivity parameter A is chosen to just match the level of output from the model to the data in a base year. I estimate the labor share by adapting an approach from Elsby, Hobijn, and Sahin (2013), who also document that labor's share of income has fallen over time in the United States. First, I use the Bureau of Economic Analysis GDP by State data to measure the share of GDP in Wisconsin going to labor earnings (wages and salaries plus supplements to wages and salaries), which is the payroll labor share. Next, I apportion some of proprietor's income to labor income. Since there is no data on labor's share of proprietor's income at the state level, I use the Bureau of Economic Analysis Major Sector Productivity and Costs data to estimate the national labor's share of proprietor's income. I assume that this share is the same at the state level, and apply the national share estimates to Wisconsin proprietor's income to get the state-level labor's share of proprietor's income. Finally, I add the payroll labor share and proprietor's labor share to get the total labor share. As in Elsby, Hobijn, and Sahin (2013), this share has declined over time in Wisconsin, but it has been relatively stable over the past decade. Thus, I take the average from 2010-2020 and set $\alpha = 0.599$.

Absent state-level measures of capital or investment, I rely on national values to set the depreciation rate. Based on data from the Bureau of Economic Analysis Fixed Asset Tables, I set $\delta = 0.075$. I do so for two reasons. First, I directly estimate the depreciation rates, as measured depreciation divided by the stock of fixed assets. These rates are increasing over time, due to changes in the makeup of capital, which has shifted toward intellectual property which depreciates more rapidly than traditional equipment and structures. Thus, I take the latest value from 2020 of 7.5%. Further, in the steady state of the model, the depreciation rate is equal to the investment to capital ratio, and the average investment to capital ratio over 2018-2020 is 7.5%.

To determine the distribution of firms across legal forms, I set the shares of the different firm types based on their payroll shares. Table 3 above provided data on employment and the number of establishments by firm size, but the model specifies shares of output. Since I assume that all types share a common production function, the output shares are the same as the shares of payrolls (employment multiplied by wages). The County Business Patterns dataset also provides data on state-level payrolls by legal form, but the Nonemployer Statistics does not. I impute payrolls to the NES assuming that average wages for each firm type are the same as in the CBP. This results in the following payroll shares: $\theta_c = 0.431, \theta_p = 0.424, \theta_g = 0.145$. We've seen above that pass-through businesses account for 89% of businesses in the state and over 50% of employment. But in addition to being smaller, pass-throughs tend to pay lower wages than corporations, and so account for 42.4% of payrolls in the state or 49.6% (that is, 0.424/(0.424+0.431)) of private payrolls.

I set both the federal and state marginal income tax rates based on my results above on the tax distribution. In Table 2 above I showed that the average effective state marginal income tax rate was approximately constant for the incomes that paid the most taxes, so I set $\tau_y^s = 0.058$. Table 4 showed that the effective federal income tax schedule did not flatten out as much, so I choose the average effective marginal income tax rate for filers making more than $100,000. These filers were responsible for over 75% of federal income taxes paid in the state, and faced an average effective rate of $\tau_y^f = 0.2112$. This value is also close to the 22%-24% statutory federal income tax rates that cover Wisconsin households with upper-middle incomes. Also, Table 4 showed that most pass-through income is concentrated at the upper end of the income distribution, so I set the state pass-through tax rate to the top state marginal income tax rate of $\tau_p^s = 0.0765$. Federally, the 2017 tax reform allowed a 20% deduction of pass-through income. I set the federal pass-through rate at $\tau_p^f = 0.28$, which is a 20% deduction off the second-highest 35% federal statutory tax rate, which is the midpoint of the 32%-37% tax brackets which cover the majority of pass-through income. I discuss the calibration of the income tax exemption parameters γ_s and γ_f below. For the state sales tax, I use the average effective sales tax rate from 2007-2019, defined as total state sales tax revenue as a share of personal consumption expenditure, which implies $\tau_c = 0.0357$.

On the expenditure side, I assume that the ratio of federal government transfers to federal government consumption is constant, and denote it by $s_f = G_t^f/(G_t^f + T_t^f)$. I also assume that the federal inflows to the state are a constant share of federal revenue raised in the state, and denote it as $m_f = M_t^f/REV_t^f$. Under these assumptions, the federal government budget constraint for the state can be written:

$$G_t^f = s_f(1+m_f)REV_t^f.$$

I use data on federal spending in the state of Wisconsin from the Rockefeller Institute (2021), which provides expenditures from 2015-2019, including transfer payments. Then from the Bureau of Economic Analysis Personal Income by State data, I take net transfers, which I define as personal current transfer receipts minus contributions for government social insurance. The difference between federal expenditures and net transfers is thus federal government consumption G_t^f, and I find that the average spending share is $s_f = 0.538$. According to this measure, the government consumption share of expenditure is higher within the state than nationally, where federal government expenditures and consumption are both directly measured. Prior to the pandemic, where transfer payments spiked, total federal government consumption accounted for roughly 30% of current expenditures.

The data from the Rockefeller Institute along with IRS Statistics of Income data on federal tax revenue raised within Wisconsin also allows me to estimate the federal government inflows. Each year in the Rockefeller data, the share of federal inflows to Wisconsin increased, from 2%

of revenue in 2015 up to 13% in 2019. I take this last value as a parameter, setting $m_f = 0.13$. Absent data on state government transfer payments, I assume that all state spending is consumption, so set $T_t^s = 0$. In total for the United States, state and local government consumption makes up about 80% of state and local government expenditure. Since federal transfers account for a smaller share of income than in the aggregate data, I assume that a similar relation holds true for state transfers. Spending by the state government G_t^s is thus endogenous, determined by the state tax revenue under the balanced budget requirement.

Given all of the parameters specified so far, the remaining parameters are chosen so that some steady state ratios in the model match certain average ratios in the data. In particular, the remaining parameters are: the federal and state effective corporate tax rates ($\tau_f^f = 0.154$, $\tau_f^s = 0.065$), federal and state income tax exemption parameters ($\gamma_f = 0.365$, $\gamma_s = 0.87$) and steady state debt ($\bar{d} = -6$). I choose these jointly to match: average federal and state corporate income tax revenue raised in Wisconsin as a share of GDP (0.95% and 0.4%, respectively over 2018-2020), average federal and state income tax collections in Wisconsin as a share of GDP (13.9% and 2.5%, respectively over 2018-2020), and the consumption share of output, defined as state personal consumption expenditures as a share of GDP (72.2% on average for 2012-2019, over which time it has been stable).

This completes the calibration of the model, which can thus replicate important aspects of the Wisconsin economy under current law. I next turn to the evaluation of the tax reform, which varies the state tax rates but keeps the rest of structure and parameters defining the economy fixed. The equilibrium will naturally change in response to the policy changes, as I now discuss.

4. Evaluating State Tax Reform

Now I turn to the results which analyze the economic impact of fundamental tax reform in Wisconsin. As discussed above, I focus on the impact of eliminating the state income tax and increasing the state sales tax to make up for at least some of the lost revenue. I first present the long run impacts from the model for a range of different policy options, from not increasing the sales tax to ensuring that there is no loss of tax revenue even on a static basis. Then I turn to the transitional impact of the two main reforms discussed above: the "all-in" plan which eliminates the state income tax and increases the sales tax to 8% in the first budget year, and the "phase-in" plan, where the income tax is gradually reduced and sales tax gradually increased over a sequence of budgets. The end result of both plans is the same, and thus they have the same long-run impact. However, the all-in plan frontloads reductions in tax revenue, in exchange for a more rapid economic impact, while phase-in plan limits revenue losses during the transition, but also delays the growth impact of the reform. For both of these transitional analyses, I compare the impact of the reforms to a baseline under current policy, for both state tax revenue and economic outcomes.

4.1 Steady State Impact of Tax Reform

First, I focus on the long-run implications of the tax reform, by analyzing the changes from current policy to a post-reform steady state. I consider a number of different reform options, each of which sets the state income tax to zero and increases the sales tax (by scaling up the effective sales tax rate in the model). The reforms differ in how high I increase the sales tax, which varies from no increase at all (keeping the current statutory rate of 5%) to a tax of 12.69%, which is what I estimate to be revenue neutral under static scoring. In each case, I compare the steady state of the model under current law with the steady state under the reform. For comparison, I also compute the revenue losses and average tax reduction under static scoring. The results are presented in Table 5.

Before discussing these results in detail, it is worth recalling the mechanisms which result in economic changes in response to the changes in tax policy. Some of the impacts can be seen directly from expressions for the steady state of the economy. In particular, the steady state levels of the capital-labor ratio, real wage, labor input, and output are given by:

$$\frac{K}{h} = \left(\frac{\frac{1}{\beta} - 1}{(1 - \bar{\tau}_f)\alpha A} + \frac{\delta}{\alpha A} \right)^{\frac{1}{\alpha - 1}},$$

$$w = (1 - \alpha) A \left(\frac{K}{h} \right)^{\alpha},$$

$$h = \left(\frac{(1 - \tau_y)}{(1 + \tau_c)} w \right)^{\frac{1}{\omega - 1}},$$

$$Y = A \left(\frac{K}{h} \right)^{\alpha} h.$$

A reduction in state income taxes lowers the tax on pass-through businesses and thus cuts the average effective business tax $\bar{\tau}_f$. This increases firms' demand for capital, increasing the steady-state capital-labor ratio. Since capital and labor are complements in production, where more capital increases the productivity of labor, firms demand more labor as well, and offer higher (pre-tax) wages to workers. Households thus earn higher pre-tax wages w, in addition to the increase in after-tax wages from reduction in taxes τ_y on their labor earnings. Both of these factors point toward an increase in employment. An increase in the sales tax τ_c has an offsetting effect, as money earned on the job can buy fewer consumption goods. For the policy changes I consider, this effect only partially offsets the wage impacts, and employment increases. Then output increases both due to the higher capital-labor ratio (coming from the supply-side impact on business taxation) as well as increased employment (coming from both the business tax cut which increases demand for labor by firms and the household tax cut which increases labor supply by households).

Not shown here, since the expressions are more complicated, is the impact of the tax reform on household consumption and after-tax income. For each dollar of income, the increased sales tax reduces consumption in favor of saving. However, income increases with the increased employment and wages, so the level of consumption increases. Note as well that some of the economic impacts, such as the impact on the capital-labor ratio and thus wages, depend only on the effective business tax. Thus, the magnitude of these changes is the same across the different reforms that vary the sales tax.

In addition to these dynamic economic impacts, which are my focus, Table 5 reports two static calculations: the size of the average tax cut and the percentage change in state tax revenue. The static revenue scores provide useful benchmarks because they are similar to how state agencies would evaluate the reforms. By comparing with the dynamic impacts, the static scores also illustrate how behavioral responses and economic growth dynamic impact tax revenue. The size of the average tax cut is calculated from the results discussed above: I take the $2,796 in income taxes per household and then deduct the incremental sales taxes paid when the rate increases (the increase over the $1,818 base taxes paid at 5% rate). The static revenue scores are similar simple calculations: I deduct the amount of income taxes collected and add the incremental sales tax collections. In each case, I use the Census Bureau data on state tax collections with 2019 as the base year and express the changes as percent of total state tax revenue.

Table 5: Long-Run Implications of Tax Reform

	Static		Dynamic Steady State (All %)				
Sales Tax	**Average Tax Cut**	**Revenue (%)**	**Revenue**	**Output**	**Labor**	**Consumption**	**After-Tax Income**
5.00	$2,796	-43.95	-40.37	10.11	9.02	11.24	11.24
6.00	$2,432	-38.24	-30.86	9.37	8.29	9.87	10.60
7.00	$2,069	-32.52	-21.59	8.65	7.57	8.52	9.97
8.00	**$1,705**	**-26.81**	**-12.55**	**7.93**	**6.87**	**7.19**	**9.35**
9.00	$1,342	-21.09	-3.73	7.23	6.17	5.89	8.74
9.43	$1,185	-18.63	0.00	6.93	5.87	5.34	8.47
10.00	$978	-15.37	4.87	6.53	5.48	4.62	8.13
11.00	$614	-9.66	13.26	5.85	4.80	3.37	7.53
12.00	$251	-3.94	21.44	5.17	4.13	2.15	6.94
12.69	$0	0.00	26.97	4.71	3.67	1.31	6.54

The table shows that, regardless of the level of sales tax implemented, all of the proposed reforms lead to notable gains in output, employment, and after-tax incomes. That is, moving the state government tax system from an income base to a consumption base promotes relatively substantial economic gains. I take an 8% sales tax rate as my baseline policy proposal. As the table shows, this would result in an average tax cut of $1,705 per household, which means a static tax revenue reduction of 26.8%. However increased economic activity makes up more than half of the lost revenue, with the reform leading to 12.5% lower tax collections in the long run. The economic implications of the reform are strong, leading to a 7.9% increase in output and

6.9% increase in employment. Even though the sales tax rate increases by 60%, consumption grows 7.2% and after-tax incomes increase by 9.4%.

The table also illustrates how the dynamic feedback from changing the state tax system is crucial to evaluating the impact of the tax reform. Increased economic activity alone is not enough to make up the revenue lost by eliminating the income tax, but increased growth offsets some of the losses. The first line shows that simply doing away with the income tax would increase output by more than 10%, but the economic growth in itself would do relatively little to close the hole in the budget. The sales tax base would expand with the increase in consumption, but the feedback effects would only close about 10% of the revenue gap (4 of 44 percentage points). But increasing the sales tax preserves many of the economic gains of the tax reform while limiting the revenue losses. I've already discussed how an 8% sales tax closes much of the revenue gap, and the table shows that on a dynamic basis a 9.43% sales tax would be long-run revenue neutral. Even such a larger sales tax rate increase could lead to sizeable economic gains while still being evaluated as a substantial revenue loser on a static basis. To achieve static revenue neutrality would require a 12.69% sales tax rate, more than 2.5 times the current level. However, accounting for economic behavior shows that this would result in a 27% tax revenue surplus over the current level, while still generating some notable economic impacts.

4.2 Transitional Dynamics of Tax Reforms

While my analysis in the previous section focused on the long run impact of reform, I now analyze how a tax reform impacts the state economy over time. Instead of focusing solely on the change between current policy and a post-reform steady state, I now analyze the impact along the transition. The previous results show substantial gains from the tax reform, but are silent on how long it takes to get to the end result or what happens along the way. I show below that the transitions are generally monotone, and the impacts of the reform are felt relatively quickly.

I consider two dynamic versions of the tax reform which ends with an 8% sales tax. As shown above, in the steady state this leads to substantial economic gains, including a 7.9% increase in GDP, and cuts steady-state revenue by 12.6%. While this represents a substantial tax cut, it comes at a time when the state is well-positioned to absorb the lower revenue. Wisconsin has been in a period of unprecedented budget surpluses, with tax collections increasing by 11.5% in 2020, and has a balance of at least $1.7 billion in the rainy day fund (Lang 2021b). Thus, the state is due for a fiscal rebalancing, and so this provides a great opportunity for restructuring the tax code at the same time.

The first plan is what I have called the "all-in" reform, where in the first budget year the income tax is eliminated and the sales tax is increased to 8%. I also consider a "phase-in" plan, where the income tax is reduced and the sales tax is increased in steps over several years. In particular, I consider an eight-year phase in period, corresponding to four state budget cycles. In both plans, the end result is the same as the long-run analysis above, but some of the dynamic effects happen over time, and so may not be fully felt for a number of years. The all-in plan frontloads the tax revenue reductions but brings more rapid economic gains, while the phase-in plan limits near-term revenue cuts but delays some of the economic impact. In each case, I scale the results from the model to match current levels, and compare them to a baseline where tax revenue, output, and employment follow their trends under current policy.

My baseline model has assumed no adjustment costs in capital or labor, which makes it amenable for long-run analysis but perhaps less so for short-run dynamics. Since much of the adjustment in this model is on the labor side, and particularly on labor supply, I also consider a version of the model that adds a simple form of labor adjustment. While most models of adjustment costs focus on costs to firms of changing their production, I focus instead on possible delays in labor supply adjustment. Labor supply may be slow to adjust due to search frictions, costs of relocation or migration, or other costs of changing work schedules. My model also doesn't distinguish between the intensive (hours choice) and extensive (participation choice) labor margins. In the short-term it may be easier for workers to adjust their hours than it would be to bring new workers into the labor market.

I incorporate slow labor supply adjustment by adding a labor "habit" term in the utility function, where past labor choices affect current utility. In particular, I assume that preferences are now:

$$u(c_t, h_t, h_{t-1}) = \frac{\left(c_t - \frac{h_t^{\omega}}{\omega}\left(\frac{h_t}{h_{t-1}}\right)^{\eta}\right)^{1-\sigma} - 1}{1-\sigma}.$$

I treat the habit as external, meaning that labor supply choices today do not incorporate the impact on tomorrow's habit. In essence, this simply adds a utility adjustment cost to changes in the labor input but preserves the long-run implications of the previous specification. In particular, the short-run labor supply elasticity is now given by the smaller value of $1/(\omega + \eta - 1)$, while the long-run labor supply elasticity is still $1/(\omega - 1)$. I assume $\eta = 1$ and continue with my previous assumption of $\omega = 2$, so the short-run elasticity is 0.5 while the long-run elasticity is 1. This is consistent with some of the results in Keane and Rogerson (2012), as well as incorporating the increased substitution over time along the extensive margin as discussed by Chetty et al. (2011).

The labor input values in the model are total hours worked, and so combine employment and hours per worker. Over at least the past two decades, there has been no trend in hours per worker, so the long-run changes in labor correspond to changes in employment. But there have been cyclical changes in hours per worker, which (for example) fell by about 2.4% during the 2008 recession before recovering. More recently, hours per worker in recent months have increased by about 1.7% relative to pre-pandemic levels. In my results below I report changes in equilibrium labor as changes in employment, assuming that hours per worker are unchanged. But it is important to note that, especially in the short run, some of the variation in total hours may come from increased hours per worker.

To analyze the dynamic impacts of the two plans, I assume that each reform would begin in 2023, the first year of the next state budget cycle, and I consider impacts over the following decade or two. In each case, I compare the output, employment, consumption, and state tax revenue over time under the reform to current policy. I do so in two ways. First, I report percentage changes under the reforms compared to current policy, as in the steady-state analysis above. I assume that current policy determines the trend, and my model is formulated as changes in outcomes relative to that trend. But I also translate the percentages into levels, which makes some of the outcomes more interpretable. I follow the convention in state policy analysis in reporting nominal (current dollar) values.

As a baseline, I make a forecast through 2030 for the state economy under current policy. In the near term, this forecast is based on state sources, as the Department of Revenue (2021b) provides an economic forecast through 2024, while the Legislative Fiscal Bureau provides a revenue forecast through 2022 (Lang, 2021b). For years beyond those forecast, I assume that all variables grow at their recent trend growth rates. Since 2007, total tax collections and (nominal) GDP in Wisconsin have grown at 2.8% and 2.6%, respectively. To keep the government share of output constant in the baseline forecast, I take the trend of both to be 2.7%. For employment, I take a longer horizon to smooth some of the cyclical fluctuations to get a sense of the trend. From 2000-2019 nonfarm payrolls in Wisconsin grew at an average of only 0.1% per year. Finally, rather than a separate forecast for consumption (and the state sources also don't include it), I assume that consumption remains 72.2% of GDP, as in my calibration.

4.3 Impact of the Tax Reform Plans

Figure 7 shows the dynamics of output, labor, consumption, and state tax revenue under the tax reform plans for the first twenty years. Each panel of the figure shows the level of the variable relative to the trend under current policy, with period zero (here taken to be the year 2022) indexed to 1. Shown are the baseline model results for the all-in plan (in blue), the phase-in plan (in red), and the all-in plan in the modified model that includes labor supply adjustment costs.

In broad terms, all of the economic indicators show similar results: the reforms lead to sharp increases in output, employment, and consumption, and an initial decline in revenue which slowly rebounds. Further, the convergence speed is relatively fast. We know that eventually all of the plans end up in the same steady state, and most of the gaps among policies are closed after the first decade and certainly by the end of twenty years. Most of the gains are front-loaded. For example, under the all-in plan output increases by 5.2% over the first five years, on the way to a long-run increase of 7.9%.

The figure also shows that labor adjustment costs have relatively little impact. They dampen the initial response at the date of enactment, with output and labor growing about half as fast in the first year with the costs compared to without, and then all variables ramping up more smoothly thereafter. But the differences are relatively small, particularly for state revenue. Thus, while adjustment costs may matter for near-term predictions of the impact of the tax reform, after a couple of years their importance is swamped by the magnitude of the underlying policy change and its economic impact.

The particular phase-in plan I consider consists of three two-year budget cycles where the tax policy changes, hitting the end values in the fourth. That is, income tax rates are cut by 25% (relative to their initial values) in each of the first three budgets, before being eliminated in the fourth. In particular, this implies top marginal tax rates of 7.65% before the reform, 5.74% in the first reform budget, 3.83% in the second, 1.91% in the third, and finally ending at zero in the fourth and thereafter. Similarly, the sales tax rate is increased to 5.5% in the first budget, 6.5% in

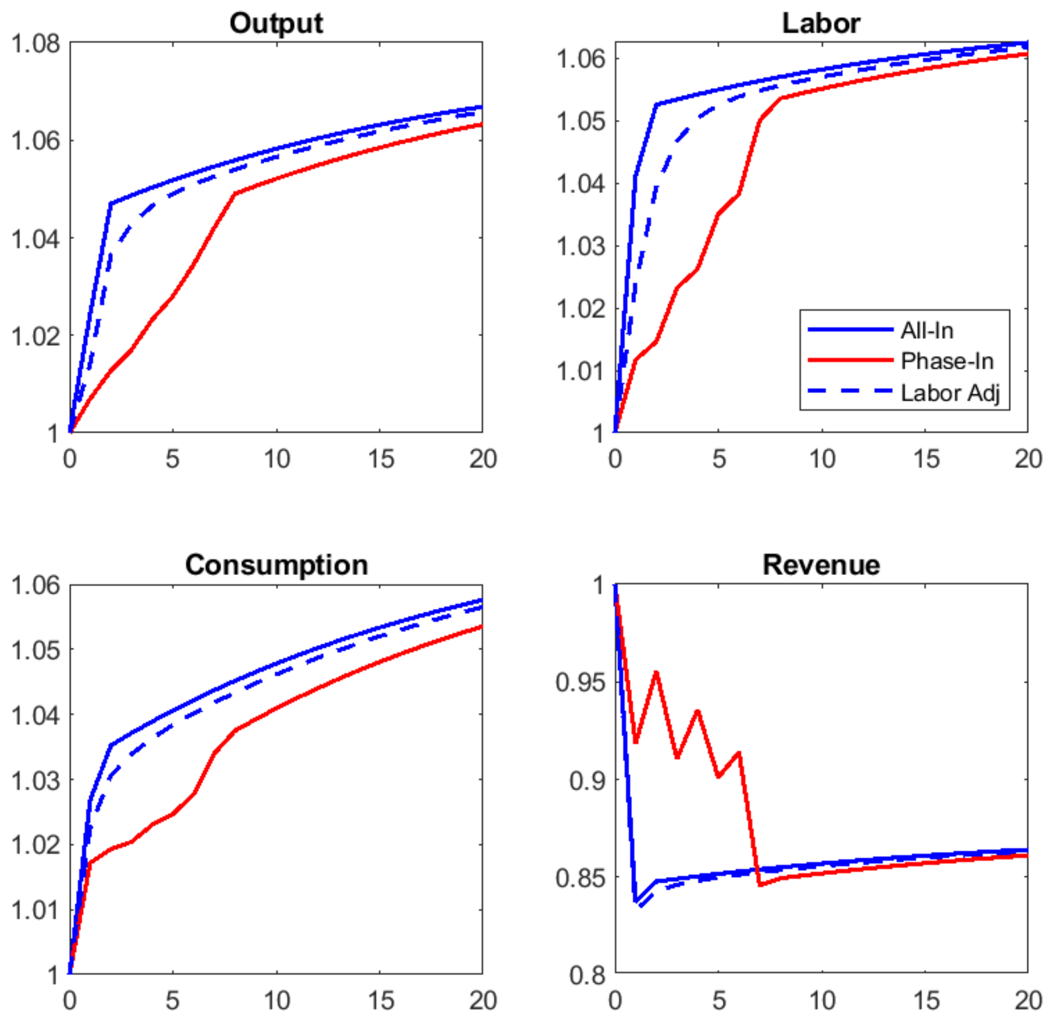

Figure 7: The transitional effects of the tax reform plans on output, labor, consumption, and state tax revenue. Each variable is indexed relative to trend, with the reforms implemented at date zero. Shown are the all-in plan (solid blue), phase-in plan (red), and all-in plan with labor adjustment costs (blue dashed).

the second, and 7.5% in the third, before ending at 8% in the fourth and thereafter. I consider a perfect-foresight equilibrium, where all households and firms know the full phase-in plan and take it into account when making decisions.

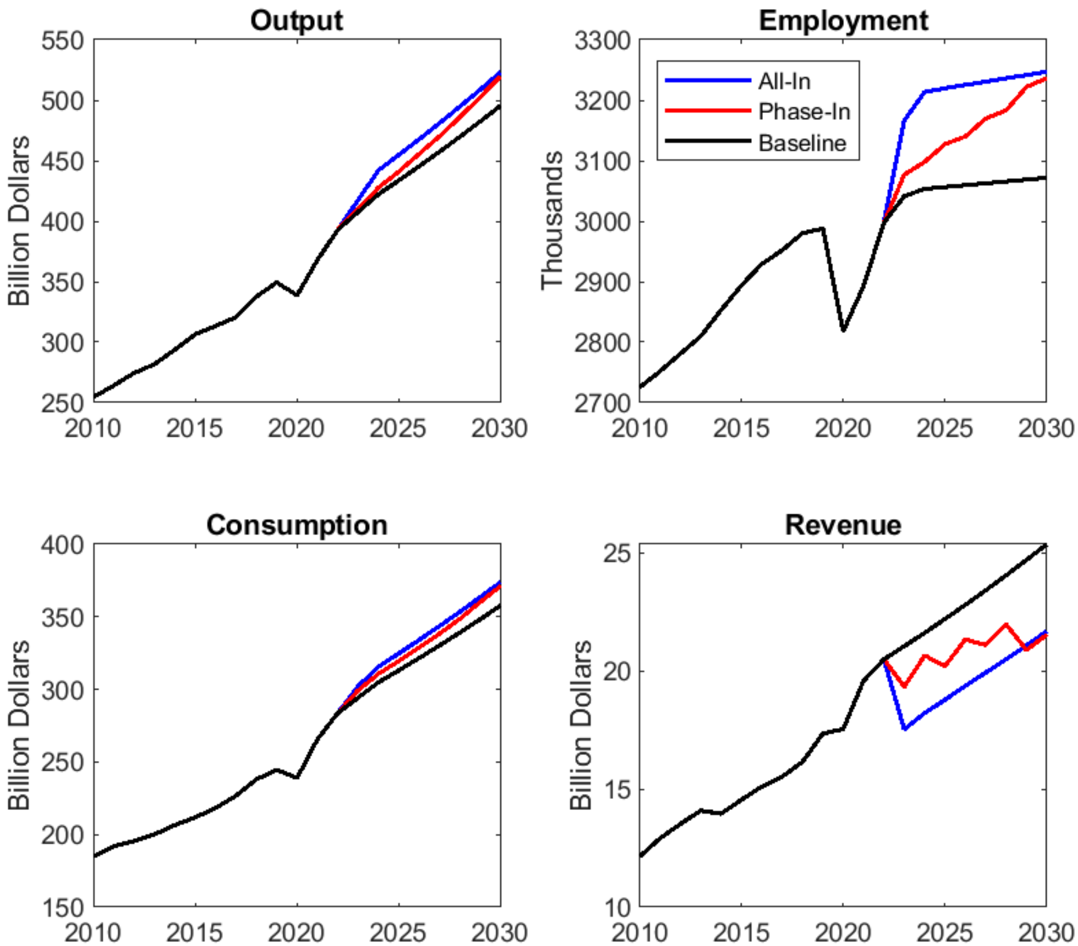

Figure 8: The transitional effects of the tax reform plans on output, labor, consumption, and state tax revenue. Each variable is indexed relative to trend, with the reforms implemented at date zero. Shown are the all-in plan (blue) and the phase-in plan (red) along with historical data and a baseline forecast under current policy (black).

Figure 7 shows that this plan leads to a slower increase in output, employment, and consumption during the phase-in period of the first eight years. For example, output increases by 2.8% in the first five years under the phase-in plan, as opposed to 5.2% over the same span under the all-in plan. The potential benefit of the phase-in plan is that it limits the revenue losses during the phase-in period. Given the staggered nature of the phase-in plan, with tax rates changing every two years, tax revenue has a saw-toothed pattern on the transition: falling when tax rates change and then recovering the following year (when rates remain the fixed). Over the six years of the first three budgets, revenue drops less than 10% relative to the baseline, before falling further with the full elimination of the income tax. Recall that these are changes in the level of revenue relative to the baseline. Therefore, the revenue reduction under the phase-in plan could essentially be achieved with two smaller spending cuts of around 8% in the first and fourth budgets. By contrast, the all-in plan would require one larger reduction of about 16% in the first budget.

Instead of percentage changes, Figure 8 plots the levels of the same variables under the tax reform plans, along with historical data and the baseline forecast under current policy. I don't plot here the case with labor adjustment costs, which again looks like smoothed version of the all-in plan. The overall message is the same as above. Under the all-in plan output, employment, and consumption grow rapidly over the first few years of the reform, while there is a slower but steady increase under the phase-in plan. By 2030 all of the variables under the two reforms end up in nearly the same place.

The figure also helps put the magnitude of the tax revenue cuts in context. Under the all-in plan, state tax revenue in 2023 would fall by about $3 billion in absolute terms from 2022 and about $3.5 billion relative to what it would be in 2023 under current policy. But that simply returns state tax revenue in 2023 to almost the same level it was in 2020, before the huge increase in 2021. After that initial cut in 2023, tax revenue continues to increase. The phase-in plan leads to a smaller cut in 2023, of about $1.2 billion from 2022 or about $1.7 billion relative to what it would be under current policy. After that initial cut, tax revenue under the plan would generally trend upward, with an additional $1.1 billion dip in 2029 (or $1.7 billion additional cut relative to the baseline).

Undoubtedly, the model implies strong employment effects of the tax reform. Under the baseline forecast, employment would revert to its slow average growth of 0.1% per year, driven by the slow growth of the labor force in the state. The model predicts a strong employment surge in the first two years in response to the all-in plan, with an increase of about 160,000 jobs over that span, then continued but slower growth after that. As above, this initial surge would be tempered somewhat with labor adjustment costs, but the overall trend would be similar. Under the phase-in plan, the model predicts that employment would largely continue on its pre-pandemic growth trend. While these effects are large, recall that the average marginal tax rate on labor income is 5.8%, which would drop to zero under the reform. Thus, while the labor supply effects are large in magnitude, they come in response to a large change in take-home pay. Fundamental tax reform in Wisconsin has the promise of increasing labor market participation among state residents, as well as increasing the population and labor force by drawing new workers from out of state. See Kleven et al. (2020) and Moretti and Wilson (2017), for recent evidence on the strong impact of state taxes on migration.

5. Conclusion

This paper has shown that fundamental tax reform has the opportunity to substantially improve economic outcomes in the state of Wisconsin. Eliminating the state income tax, while increasing the sales tax to make up at least some of the lost revenue, would lead to increases in output, employment, consumption, and after-tax income. In particular, increasing the sales tax to 8% would provide Wisconsin households with an average tax cut of roughly $1,700 and lead to 7.9%

higher output in the long run. If the reform were implemented all at once, the model suggests rapid growth in employment, averaging about 1 percentage point additional output growth each year for the first five years. If the reform were phased in over time, the growth surge would be slower, adding an average of about 0.5 percentage points to output growth over a decade. But under either plan, output and incomes would ultimately end up at the same, higher level.

To analyze the impact of such fundamental tax reform, I developed a structural model of the state economy. My model is based on standard models in the literature, but is adapted to study state tax reform. Of course, the model abstracts from many features of the state economy and sources of heterogeneity. The model also precludes adjustments along some margins, some of which could amplify the impact of the tax reform. Future work will consider extensions of the baseline model along several dimensions to relax these restrictions.

But even in this relatively simple setting, I introduce several new features which are crucial in the analysis. The Wisconsin state income tax is progressive and hits the same adjustment margins as the federal income tax, which compounds economic distortions. Further, I document that the majority of employment in the state is at pass-through businesses, whose income is subject to the individual income tax. Thus, the state income tax particularly hits the capital of small businesses. Eliminating the state income tax reduces these distortions, promoting economic efficiency, and resulting in strong improvements in living standards in the state.

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