A Better Path Forward for Iowa Tax Reform

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EXECUTIVE SUMMARY

Iowa began a necessary tax reform effort in 2018 to reduce burdensome taxes on residents and businesses. Once fully implemented, that effort promises to make Iowa a national tax policy leader, but more work remains to be done. Many of the 2018 reforms are contingent on economic conditions and future revenue targets that are far from guaranteed. Delaying the reforms for even a few more years subjects Iowa families and companies to some of the highest tax rates in the country, and hinders even greater economic growth. More immediate pro-growth income tax reforms will enable Iowa employers to invest more in their businesses and workers, allow households to keep more of their hard-earned income, and make the state more economically competitive.

This report examines the potential benefits of pursuing a more pro-growth tax environment. Although Iowa's 2018 tax reform took positive steps forward, it needlessly restricts implementation with arbitrary revenue conditions or "triggers." A better approach would tie pro-growth reforms to balanced, revenue-neutral tax increases or government spending cuts. Such a strategy would keep Iowa fiscally stable while foster a more worker- and business-friendly environment.

Using the Economic Research Center's dynamic economic scoring model, we analyze the effect of four tax reform scenarios on Iowa businesses and households to generate debate about how to bring more pro-growth tax reform to Iowa building upon the 2018 tax reform efforts. Each reform scenario reveals clear benefits to Iowa's economy and substantial tax savings for families and businesses. Our analysis shows:

1) *Modest reforms can lead to economic benefits*. A one-cent sales tax increase combined with a revenue-neutral cut in personal and corporate income taxes yields: $250 million of economic growth in the first year; greater business investment; growing consumer activity; and, thanks to economic growth, about $40 million more tax revenue than expected in the first year.

2) *More reform following implementation of the 2018 tax bill can accelerate economic growth further*. Even assuming the 2018 tax bill is fully implemented, continuing to cut personal income taxes with an offset of a one-cent sales tax increase builds upon the 2018 reforms with more than $250 million more in economic activity than expected and further tax savings for families.

3) *Pro-growth income tax reforms benefit families and businesses, even with other tax increases.* Tax reform with a top personal income tax rate of 5.5 percent, a top corporate income tax rate of 6 percent, and a revenue-neutral sales tax increase would generate more than $610 million more than expected growth, save taxpayers more than $1,249 on average in taxes, and lead to more than $400 million more in business investment.

4) *Pro-growth income tax reforms combined with eliminating tax expenditures will improve the status quo.* A similar scenario of pro-growth tax reform combined with eliminating income tax credits and broadening the sales tax base yields better-than-expected economic growth of $450 million in the first year as the tax system is made fairer, benefiting both families and businesses.

Iowa should take full advantage of its economic strength and recent budget surpluses to pursue these pro-growth tax reforms sooner rather than later. As our dynamic economic model demonstrates, strategic, commonsense tax reforms will not jeopardize the state's sound fiscal budget. Instead, adopting pro-growth strategies today will make Iowa households and businesses more prosperous, spur corporate investment, increase take-home pay, and establish the state as a national tax policy leader for years to come. State policymakers should not miss that opportunity.

INTRODUCTION

The American economy and labor force continue to grow. Workers are earning higher wages and state economies have benefited greatly from the 2017 federal tax reform. Iowa is no exception. The state has enjoyed economic success during the current post-recession economic expansion, with an unemployment rate hovering at a historically low 2.5 percent, with almost 1.6 million jobs in the economy, and with thousands of job openings posted across the state.[1] Such prosperity, however, has come despite and not because of Iowa's contractionary tax policies. Boasting some of the highest income tax rates in the country, Iowa's tax system hinders what could be even greater economic growth and prosperity for its residents and businesses.[2] Positive tax reform steps have been taken recently, but improvements and stronger strides can and should be made.

Before the state's 2018 tax reform, Iowa's top individual income tax rate was still 8.98 percent, the sixth highest in the country, trailing only Minnesota among its neighbors.[3] That top rate combined with a tax deduction that requires paying more in state taxes when the federal government cuts income taxes, makes Iowa one of the "least tax-friendly" states in the nation.[4]

Iowa's corporate taxes were even worse. Before the 2018 tax reform, the state's top corporate income tax rate was 12 percent—claiming the title for the highest in the country. After the 2018 tax reform, it will now be reduced to 9.8 percent in 2021. Yet, worse still, corporate tax carve-outs leave some of Iowa's largest companies with virtually no tax liability at all while still burdening smaller entrepreneurs with egregiously high rates.[5] As Iowa continues its tax reform effort, policymakers should look to eliminate special interest subsidies and corporate exemptions, and lower rates for all employers instead.

Lowering corporate and individual income taxes benefits state economies through more business investment, more job creation, and more take-home pay for

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[1] **Iowa's Unemployment Rate Holds Steady At 2.5 Percent**, Iowa Workforce Development press release, October 18, 2019.
[2] Jared Walczak, Scott Drenkard, and Joseph Bishop-Henchman, ***2019 State Business Tax Climate Index***, Tax Foundation, September 26, 2018.
[3] Morgan Scarboro, ***State Individual Income Tax Rates and Brackets for 2018***, Tax Foundation, March 5, 2018; and ***Summary of 2019 Key Effective Dates***, Iowa Department of Revenue, July 10, 2018.
[4] Rocky Mengle and David Muhlbaum, **The 10 Least Tax-Friendly States in the U.S.**, Kiplinger.com, October 1, 2019.
[5] Rick Smith, **Iowa Subsidizing Huge State Companies With Runaway Tax Credits**, Iowastartingline.com, February 22, 2018.

families.[6] Lower corporate taxes reduce the cost of doing business, which allows employers to reinvest tax savings in their employees (higher wages) and their company (workforce and equipment improvements). Likewise, lower household income taxes allow families to keep their hard-earned income and save or spend it as they see fit. Both tax reductions foster economic growth through saving, spending, and private investment.

Fortunately, state fiscal stability, sound budgets, and economic boons have given Iowa budget surpluses that have kept Iowa's rainy-day funds full and prepared for the next economic downturn.[7] Policymakers now have the opportunity to further reform state tax policy and return more tax dollars to Iowans without jeopardizing future budgets.[8] That opportunity should not be missed.

[6] Alberto Alesina and Silvia Ardagna, "**Large Changes in Fiscal Policy: Taxes versus Spending**," *Tax Policy and the Economy*, Volume 24 (August 2010) p. 35-68; Neil Bania, Jo Anna Gray, and Joe A. Stone, "**Growth, Taxes, and Government Expenditures: Growth Hills for U.S. States**," *National Tax Journal*, Volume 60, Number 2 (June 2007) p.193-204; and Olivier Blanchard and Roberto Perotti, "**An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output**," *The Quarterly Journal of Economics*, Volume 117, Issue 4 (November 2002) p. 1329-1368.

[7] Associated Press, **Republican leaders take cautious approach to Iowa's $289 million budget surplus**, *The Des Moines Register*, September 30, 2019.

[8] **State of Iowa General Fund Budget Projection (FY 2021 – FY 2026)**, Legislative Services Agency, July 1, 2019.

TAX PRINCIPLES FOR SUSTAINED ECONOMIC GROWTH

States have adopted various tax systems to raise revenue. Some, for example, tax the production of their natural resources, avoiding direct taxes on households, while others rely on a combination of taxes on sales, personal income, and corporate earnings. Each of these tax systems affects economic growth differently. Understanding how different taxes impact workers, families, businesses, and the overall economy can help Iowa policymakers design tax structures that promote economic growth and well-being for citizens and businesses.

By measuring the economic impact of tax structures, researchers have ranked tax systems from the most to the least economically harmful. Studies have shown that taxes on capital (*e.g.*, corporate income taxes) are the worst, most damaging taxes. Corporate taxes discourage business productivity by reducing the benefits of hiring workers or investing in infrastructure. Taxes on capital syphon resources away from productive investments and increase the cost of doing business.

The second most harmful tax, the personal income tax, penalizes working and productivity. Taxing wages not only leaves families with less take-home pay to spend on goods and services they need and want, it affects corporate productivity, too. Income taxes that significantly reduce wages can discourage workers from joining the labor force. Fewer workers reduces production capacity at firms, which, in turn, means that the economy does not grow as quickly as it could.

The least harmful taxes are consumption or sales taxes. Taxing consumption may increase the cost of goods and services, but it does not directly discourage labor or business investment, two essential elements for economic growth.

Generally speaking, high state tax rates repel businesses and high-income taxpayers, with businesses and workers both moving from high-tax to low-tax states and taking their skill sets, tax dollars, and investment capital with them.[9]

[9] Mark Gius, "**The effect of income taxes on interstate migration: An analysis by age and race**," *The Annals of Regional Science*, Volume 46, Issue 1 (February 2011) p.205-218; Joshua Rauh and Ryan J. Shyu, **Behavioral Responses to State Income Taxation of High Earners: Evidence from California**, working paper, National Bureau of Economic Research, October 2019; Barry W. Poulson and Jules Gordon Kaplan, "**State Income Taxes and Economic Growth**," *Cato Journal*, Volume 28, Number 1 (Winter 2008) p.53-71; Cristobal Young and Charles Varner, "**Millionaire Migration And State Taxation Of Top Incomes: Evidence From A Natural Experiment**," *National Tax Journal*, Volume 64, Number 2 (June 2011) p.255-283; Timothy J.

Not surprisingly, lower-tax states and states with no income tax attract high-income workers and businesses with the resources to relocate.[10] And recent IRS and Census data confirm such interstate migratory tendencies.[11] One study on interstate migration compared the combined state and local tax burdens of the largest cities in each state and ranked Des Moines among the 10 highest-tax cities in the country.[12] A Des Moines household earning $75,000 would pay $8,811 in taxes, while a household in Sioux Falls earning $150,000 would pay only $7,832.[13] With such an adverse, uncompetitive tax code, Iowa is more likely to lose residents than attract them. And although they undoubtedly moved away for various reasons, 3,300 Iowa residents left the state in 2016, taking $256 million of total income with them.[14]

Regardless of the tax regime, tax codes should be simple, transparent, and avoid tax advantages and loopholes that narrowly target only a few taxpayers. Transparent tax codes help foster greater economic growth by ensuring that personal, corporate, and state resources are not wasted on tax compliance. Complicated tax structures, filled with loopholes and carve-outs, favor those with more accounting resources. Such systems ultimately force higher rates on others, create artificial market distortions, and slow economic growth by taking away resources that could be put to more productive uses.

Bartik, "**Business Location Decisions in the United States: Estimates of the Effects of Unionization, Taxes, and Other Characteristics of States**," *Journal of Business & Economic Statistics* Volume 3, Number 1 (January 1985) p.14-22; and Chris Edwards ***Tax Reform and Interstate Migration***, The Cato Institute, September 6, 2018.

[10] Joshua Rauh and Ryan J. Shyu, **Behavioral Responses to State Income Taxation of High Earners: Evidence from California**, working paper, National Bureau of Economic Research, October 2019; and Cristobal Young and Charles Varner, "**Millionaire Migration And State Taxation Of Top Incomes: Evidence From A Natural Experiment**," *National Tax Journal*, Volume 64, Number 2 (June 2011) p.255-283.

[11] Chris Edwards ***Tax Reform and Interstate Migration***, The Cato Institute, September 6, 2018; The Census Bureau did not ask if taxes were a reason for moving.

[12] *Ibid.*

[13] Chris Edwards ***Tax Reform and Interstate Migration***, The Cato Institute, September 6, 2018. This report is based on data from 2016, so it does not account for changes in either state's taxes since then or the changes to SALT deductions.

[14] *Ibid.*

INITIAL PROPOSALS TO GROW IOWA'S ECONOMY

In 2016, the Tax Foundation suggested four tax reforms for making Iowa's business climate more competitive.[15] Before turning to those specific suggestions, it is important to understand which aspects of the Iowa tax code need improvement and why.

First, Iowa has an uncommon practice of deducting federal income taxes for households and corporations. Though federal law allows taxpayers to deduct their state income taxes in order to lower their federal tax liability, only six states allow federal income taxes to be deducted when determining a household's state tax burden. Of those six states, only Iowa does not place any sort of adjustments or caps on federal deductibility.[16] That makes Iowa's tax revenue even more sensitive to the vagaries of the federal tax code because there are no constraints on how much taxpayers may deduct from their state tax bill.

Iowa's federal tax deductibility also means that changes in the federal tax code can have unintended effects on Iowan's tax bills. Although the federal Tax Cuts and Jobs Act (TCJA) in 2017 lowered taxes significantly for middle-class taxpayers, because of federal tax deductibility, Iowa state income taxes rose—or would have if the state legislature had not responded quickly.[17] Moreover, any further changes to the federal tax code will continue to affect state revenues in ways that state lawmakers cannot control until at least 2023, when federal tax deductibility may be eliminated.[18]

According to the Iowa Legislative Bureau, eliminating federal tax deductibility is 26 years overdue.[19] Because "higher income individuals pay a larger percentage in federal tax, they receive a proportionally larger deduction from their state income

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[15] Jared Walczak, Joseph Henchman, Scott Drenkard, and Nicole Kaeding, ***Iowa Tax Reform Options: Building A Tax System For The 21st Century***, Tax Foundation, May 5, 2016.
[16] Alabama, Louisiana, Missouri, Montana, and Oregon are the others; Tonya Moreno, **States That Allow You to Deduct Federal Income Taxes**, thebalance.com, March 3, 2019.
[17] William G. Gale, Hilary Gelfond, Aaron Krupkin, Mark J. Mazur, and Eric Toder, ***Effects of the Tax Cuts And Jobs Act: A Preliminary Analysis***, Tax Policy Center, June 13, 2018; and Brianne Pfannenstiel, **Tax overhaul could mean Iowans pay more to the state**, *The Des Moines Register*, January 5, 2018.
[18] ***Summary of Key Effective Dates 2021-2023***, Iowa Department of Revenue, July 10, 2018.
[19] ***Issue Review: Federal Income Tax Deductibility***, Iowa Legislative Fiscal Bureau, October 20, 1993.

tax,"[20] which makes federal tax deductibility a regressive state policy that leads to higher tax rates, a more complex tax structure, and a less competitive Iowa economy. And although federal tax deductibility could give the state a competitive edge over its neighbors, that potential advantage dwindles under the new TCJA limits. Before the TCJA, high-tax states still retained businesses and residents that benefited from federal deductions for state and local taxes. Under the TCJA's new $10,000 maximum deduction, however, families in high income tax states no longer reap the same benefit.[21]

Second, Iowa's state sales tax is needlessly high because it includes too many exemptions. The Iowa Department of Revenue listed 170 different tax expenditures in 2015. As the Department noted, many of the exemptions, wisely, are meant to avoid taxing business inputs and are thus not "true" tax expenditures. But many of Iowa's sales tax expenditures apply to goods and services only purchased by consumers, which narrows the tax base and keeps rates higher than they need to be.

We identified 18 of the largest tax expenditures that apply to consumer goods and services.[22] If these exemptions had not been on the books in 2015, the state would have raised an additional $1.4 billion, 62 percent more than the $2.2 billion in actual collections.[23] Eliminating these exemptions would allow for a lower tax rate on a larger basket of goods and services, and reduce the economic distortions that occur when the sales tax does not treat all goods and services equally.

Third, Iowa extends a number of tax credits to certain businesses and activities.[24] As a result, the state gave up more than $246 million in tax revenue in 2018 alone.[25] Giving tax breaks only to some businesses means that rates have to be higher overall, hurting companies that may not have the resources or satisfy the right conditions to take advantage of such benefits. The Research Activities Credit,

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[20] *Ibid.*
[21] William G. Gale, Hilary Gelfond, Aaron Krupkin, Mark J. Mazur, and Eric Toder, ***Effects of the Tax Cuts And Jobs Act: A Preliminary Analysis***, Tax Policy Center, June 13, 2018
[22] **2015 Iowa Tax Expenditures: Initial Release**, Iowa Department of Revenue, December 31, 2015; those goods and services are: Accounting and Bookkeeping Services – Consumer, Architectural and Engineering Services – Consumer, Debt Counseling Services, Dental Services, Fishing and Hunting Guide Services, Food Sales for Human Consumption, Gambling Boat Games and Admissions, Information Services, Legal Services – Consumer, Marina Services, Massage Therapy, On-Line Computer Service – Consumer, Solar Energy Equipment, Tax Return Preparation Services – Consumer, Transportation Services and Delivery Charges, Veterinary Products and Services – Small Animal.
[23] **Retail Sales and Use Tax Annual Report Fiscal Year 2015**, Iowa Department of Revenue, December 2015.
[24] Rick Smith, **Iowa Subsidizing Huge State Companies With Runaway Tax Credits**, Iowastartingline.com, February 22, 2019.
[25] ***Tax Credits Contingent Liabilities Report***, Iowa Department of Revenue, March 19, 2015.

for example, gives a refundable tax credit to companies with the resources and manpower to research ways to improve their own manufacturing processes. Companies without surplus financial resources for research, however, cannot receive this credit. Such special interest tax credits make tax codes more complex, divert limited resources from productivity to tax compliance, and ultimately hinder economic growth.

Finally, Iowa's alternative minimum tax (AMT), which applies to personal and corporate income taxes, makes the state's tax code less transparent and overly complex. The AMT aims to ensure that taxpayers do not avoid paying taxes by taking advantage of other provisions of the tax code. Those other provisions, however, create problems that the AMT does not solve. Only about one percent of Iowa businesses pay the AMT, so it raises little revenue, yet all businesses and households must incur the compliance costs of calculating their AMT liability. It would be simpler, more transparent, and fairer to eliminate any preferential treatment in the tax code and simply charge all taxpayers in each group (households and businesses) the same, lower rate.[26]

The Tax Foundation's report in 2016 ranked Iowa's business climate 40th among the states. Since then, Iowa made a few economically beneficial changes to the tax code, but other recommendations have yet to be implemented. Unfortunately, these shortcomings were not addressed sooner or Iowa could be among the top 10 states in the business climate rankings.[27] With its economy currently thriving, Iowa has the opportunity to make significant tax reforms that will help ensure that its economy continues to expand and will weather future economic storms.

[26] Jared Walczak, Joseph Henchman, Scott Drenkard, and Nicole Kaeding, ***Iowa Tax Reform Options: Building A Tax System For The 21st Century***, Tax Foundation, May 5, 2016.
[27] *Ibid.*

RECENT REFORMS TAKE STEPS IN THE RIGHT DIRECTION

In 2018, the Iowa legislature enacted tax reforms that benefit families and businesses by allowing them to keep more of what they earned. The recent measure promises to make the state gradually more economically competitive in the years to come. In 2019, Iowa cut its personal income tax rates for the first time in more than 20 years.[28] That means a married couple with one child making $55,000 per year will see their total tax bill fall $632—enough to cover about six months of the average Midwest family's electricity bill ($1,310 per year).[29] Such savings have been shown to help economies grow and wages increase.[30]

On the business side, beginning in 2020, Iowa's corporate tax structure will align with federal tax rules and adopt the federal definition for taxable income. Such conformity helps reduce the state tax burden for companies insofar as they will no longer have to calculate their "income" twice, once for federal and once for state tax purposes.[31] That change, along with the repeal of the corporate AMT and its associated tax credit in 2021 and 2022, will make tax compliance simpler and less expensive for businesses.[32]

Finally, starting in 2021, the state's corporate income tax will continue to improve. The top tax bracket rate will drop from 12 percent to 9.8 percent and federal tax deductibility will be eliminated.[33] These reductions will encourage more business

[28] **Iowa Tax Rate History**, tax.iowa.gov (Last visited August 16, 2019).
[29] **Table 1800. Region of residence: Average annual expenditures and characteristics, Consumer Expenditure Survey, 2017-2018**, bls.gov (Last visited October 4, 2019).
[30] Brian Goff, Alex Lebedinsky and Stephen Lile, "**A Matched Pairs Analysis of State Growth Differences**," *Contemporary Economic Policy*, Volume 30, Issue 2 (April, 2012) p. 293-305; W. Robert Reed, "**The Robust Relationship between Taxes and U.S. State Income Growth**," *National Tax Journal*, Volume 61, Number 1 (March 2008) p. 57-80; John K. Mullen and Martin Williams, "**Marginal tax rates and state economic growth**," *Regional Science and Urban Economics*, Volume 24, Issue 6 (December 1994) p. 687-705; Christina D. Romer and David H. Romer, "**The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks**," *American Economic Review*, Volume 100, Number 3 (June 2010) p. 763-801; Karel Mertens and Morten O. Ravn, "**The Dynamic Effects of Personal and Corporate Income Tax Changes in the United States**," *American Economic Review*, Volume 103, Number 4 (June 2013) p. 1212-1247; Jens Matthias Arnold, Bert Brys, Christopher Heady, Åsa Johansson, Cyrille Schwellnus, and Laura Vartia, "**Tax Policy for Economic Recovery and Growth**," *The Economic Journal*, Volume 121, Issue 550 (February 2011) p. F59-F80.
[31] Jared Walczak, ***Toward a State of Conformity: State Tax Codes a Year After Federal Tax Reform***, Tax Foundation, January 28, 2019.
[32] **Summary of Key Effective Dates**, Iowa Department of Revenue, January 23, 2019.
[33] *Ibid.*

investment and job creation, strengthen the state's economy, and make it easier for businesses to expand into the Hawkeye State.[34]

Unfortunately, even as Iowa benefits from greater economic growth, lower taxes, and a broader tax base, some other promising economic advantages of the recent tax reform—such as reducing the top personal income tax rate to 6.5 percent—may be delayed or never occur at all due to conditions or "triggers" written into the law.[35]

Several states have used so-called tax triggers to make long-needed changes to their tax codes. But the devil, as always, remains in the details.[36] If triggers are not designed thoughtfully, the intended tax changes may not actually happen. Or, if the triggered reforms do happen, they may create new budget problems down the road.[37] Well-designed tax triggers, on the other hand, phase-in tax cuts slowly so as to avoid large, sudden drops in state tax revenue. By doing so, they help make the tax system more predictable for households, businesses, and governments—and economies, just like household budgets, like predictability.

Iowa's tax triggers have two common components: the "benchmark" and the "baseline." The "benchmark" trigger requires reaching $8.3146 billion in general fund revenues before any tax changes can occur.[38] This is achievable provided that the current economic expansion continues and Iowa's general fund revenue grows by an average of 3.44 percent, in nominal terms, between 2018 and 2022.[39] But

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[34] Claudio A. Agostini, "**The Impact of State Corporate Taxes on FDI Location**," *Public Finance Review*, Volume 35, Issue 3 (May 2007) p. 335-360; Xiaobing Shuai and Christine Chmura "**The Effect of State Corporate Income Tax Rate Cuts on Job Creation**," *Business Economics*, Volume 48, Issue 3 (July 2013) p. 183-193; J. William Harden and William H. Hoyt, "**Do States Choose Their Mix of Taxes to Minimize Employment Losses?**" Volume 56, Number 1, Part 1 (March 2003) p. 7-26; Young Lee and Roger H. Gordon, "**Tax structure and economic growth**," *Journal of Public Economics*, Volume 89, Issues 5-6 (June 2005) p. 1027-1043; Simeon Djankov, Tim Ganser, Caralee Mcliesh, Rita Ramalho, and Andrei Shleifer, "**The Effect of Corporate Taxes on Investment and Entrepreneurship**," *American Economic Journal: Macroeconomics*, Volume 2, Number 3 (July 2010) p. 31-64.

[35] Photography services will now be subject to the sales and use tax; online sales will be subject to the state sales tax; and hotel/motel services and auto rentals are now subject to marketplace seller rules; **Summary of Key Effective Dates**, Iowa Department of Revenue, January 23, 2019.

[36] Tax triggers are policy tools that automatically modify the tax code if certain conditions are met. They are designed so that once the state hits a particular revenue level or revenue growth meets some threshold, tax rates are automatically lowered.

[37] Jared Walczak, ***Designing Tax Triggers: Lessons from the States***, Tax Foundation, September 7, 2016.

[38] Kansas and Massachusetts made the mistake of designing tax triggers that kick in simply if general fund revenue *growth* is sufficiently high from one year to the next. If their state economies grow significantly in one year, leading to higher tax revenues, tax rates are reduced. But using revenue growth alone as the benchmark means these states may face a budget shortfall if the economy contracts significantly the following year.

[39] According to Iowa's Legislative Services Agency, the average rate of growth in general fund revenues between 2001 and 2018 was 3.6 percent; **State of Iowa General Fund Budget**

any economic recession in Iowa between 2019 and 2022 could see revenues fall shy of the benchmark. Iowa's general fund revenues, for example, fell by an average of 2.8 percent during the recessions from 2001 to 2002, and again from 2007 to 2009. Another downturn would postpone the intended tax reform, keeping Iowa tax rates high and preventing opportunities for economic growth and business development.[40]

Similarly, the "baseline" trigger requires general fund revenue to grow by at least four percent between 2021 and 2022 in order for the new rates to apply in 2023. This condition misguidedly ties the required growth to a specific year. Basing triggers on both benchmarks and baselines in specific years undermines the likelihood that these tax reforms materialize.[41] Even if tax revenue reaches the benchmark requirement by 2022, one year of lower (but still above average) growth means that no changes to the tax code would occur in 2023.

Rather than the risky double-trigger approach, Iowa could maintain delayed reform while ensuring budget stability by simply including a requirement that its two reserve funds must be sufficiently funded before lowering taxes (as they currently are) and reach an appropriate benchmark.[42] West Virginia took this approach when it used triggers to lower its uncompetitive corporate income taxes. Its conditions required the state's rainy day fund to equal 10 percent of the general fund balance before the cuts could take place.[43]

Furthermore, Iowa should eliminate the baseline condition and leave any triggers open-ended rather than tied to specific years. When North Carolina used tax triggers, for example, it specified a revenue benchmark but not a year by which it must be met.[44] Avoiding revenue shortfalls due to changing economic conditions is an understandable concern, but there are better ways to manage that concern

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Projection (FY 2021 – FY 2026), Legislative Services Agency, July 1, 2019; **Monthly General Fund Revenue Receipts Through June 30 2019**, Legislative Services Agency, July 1, 2019.

[40] *Ibid.*

[41] Jared Walczak, ***Designing Tax Triggers: Lessons from the States***, Tax Foundation, September 7, 2016.

[42] Iowa has three accounts—the Taxpayer Relief Fund (formerly the Taxpayer Trust Fund), the Cash Reserve Fund, and the Economic Emergency Fund—that are made up of proceeds from the general fund if its actual revenues are in excess of the mid-year adjusted revenue estimate. The balances of the latter two funds are expected to reach their statutory limits in 2019, totaling 10 percent of the general fund balance, and remain at that level through 2026. The balance of the Taxpayer Relief Fund has been steady at about $8 million since 2016.
See: **State of Iowa General Fund Budget Projection (FY 2021 – FY 2026)**, Legislative Services Agency, July 1, 2019; ***Program and Budget Fiscal Years 2018-2019*** , Iowa Department of Management, January 9, 2018; and ***Program and Budget Fiscal Year 2019***, Iowa Department of Management, January 10, 2017.

[43] Jared Walczak, ***Designing Tax Triggers: Lessons from the States***, Tax Foundation, September 7, 2016.

[44] *Ibid.*

than holding needed tax reforms hostage with overly-rigid benchmarks. Tax reforms should allow households and businesses to save, spend, and invest more of their hard-earned income as they see fit. Such saving, spending, and investing drives economic prosperity. But Iowa's trigger requirements seem likely to prevent some significant reforms and the ensuing prosperity from ever taking place.

Finally, Iowa lawmakers mistakenly tied eliminating the federal tax deductibility to the future triggers. Repealing the federal deductibility should be a top tax reform priority and free from conditional requirements.

Lowering taxes, ensuring economic growth, and allowing more Iowans to keep more their own money requires reforming Iowa's tax code as soon as fiscally responsible. And with full reserve funds and surplus budgets, there seems no better time than the present.

TAX PROPOSALS TO SPUR ECONOMIC GROWTH

Economists at The Buckeye Institute's Economic Research Center (ERC) developed a dynamic scoring model to analyze how changes in tax policy impact government revenues, economic activity, job creation, and business investment. The model, calibrated for Iowa with publicly available state and federal data, is based on a similar dynamic scoring framework currently used at the federal level, which includes decisions made by businesses and households. The ERC model analyzes state policy proposals using the same methods for analyzing federal tax policy proposals, modified to address a state's specific economic conditions. The model is explained more fully in Appendix A.

To illustrate the potential benefits of additional tax reform in Iowa, we model four scenarios showing the likely economic impacts of several tax policy proposals. Because pro-growth tax reform cannot pay for itself entirely, we model the effects of several scenarios ranging from small to large pro-growth, revenue-neutral reforms and reveal the benefits of corporate and personal income tax reform on Iowa's economy, families, and businesses.

Scenario 1: Economic Growth $250 Million, Taxpayer Savings $242 Annually

Recent discussion in Iowa has proposed increasing the state sales tax rate to pay for more government spending.[45] The first scenario analyzes the combined effects of a one-cent increase in the sales tax and an offset in lower tax rates for corporate and personal income taxes. Our analysis demonstrates that if the sales tax rate is increased it would be better also to lower income taxes for businesses and workers.

Increasing the sales tax would hold all current exemptions fixed, and would thus raise the tax rate without broadening the base. We present the changes to the personal income tax rates by taxable income brackets in Table 1, and the corporate income tax proposal in Table 2.

The typical taxpayer will receive modest tax savings as well from this proposal. According to the Bureau of Labor Statistics' Consumer Expenditure Survey, the

[45] William Petroski, **Bid to raise Iowa sales tax for natural resources has 'momentum', legislative leaders say**, *The Des Moines Register*, December 3, 2018.

median household in Iowa paid about $1,226 in sales taxes in 2018.[46] After raising the rate one cent, sales taxes would increase by $204 on average. Yet with the cuts to income taxes, taxpayers would save $446 on average. Combined, this equates to an average of $242 in tax savings annually.

Table 1: Personal Income Tax Proposal (2019)

Iowa Taxable Income	Current Law	Proposed Policy
$0-$1,638	0.33% of excess over $0	$0
$1,639 - $3,276	$5.41 + 0.67% of excess over $1,638	0.02% of excess over $1,638
$3,277 - $6,552	$16.38 + 2.25% of excess over $3,276	$0.33 + 1.60% of excess over $3,276
$6,553 - $14,742	$90.09 + 4.14% of excess over $6,552	$52.74 + 3.49% of excess over $6,552
$14,743 - $24,570	$429.16 + 5.63% of excess over $14,742	$338.57 + 4.98% of excess over $14,742
$24,571 - $32,760	$982.48 + 5.96% of excess over $24,570	$828.01 + 5.31% of excess over $24,570
$32,761 - $49,140	$1,470.60 + 6.25% of excess over $32,760	$1,262.90 + 5.60% of excess over $32,760
$49,141 - $73,710	$2,494.35 + 7.44% of excess over $49,140	$2,180.18 + 6.79% of excess over $49,140
$73,710+	$4,322.36 + 8.53% of excess over $73,710	$3,848.41 + 7.88% of excess over $73,710

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These modest reforms simply reduce rates so that static revenue estimates of the sales tax increase are offset by a decrease in corporate and personal income taxes by the same magnitude.

[46] **Table 3114. Midwestern region by income before taxes: Average annual expenditures and characteristics, Consumer Expenditure Survey, 2017-2018**, bls.gov (Last visited November 26, 2019); For households making between $50,000 and $69,999. In 2019, Iowa's median household income was $68,718, **Median Household Income in Iowa**, fred.stlouisfed.org (Last visited November 26, 2019); amount of sales tax paid is computed according to: Barbara Johnson-Cox, "**Sales Tax in CE Data**," bls.gov (Last visited November 26, 2019).

Table 2: Corporate Income Tax Proposal (2021)

Iowa Taxable Income	Current Law	Proposed Policy
$0-$100,000	5.5% of excess over $0	4.85% of excess over $0
$100,001-$250,000	$5,500 + 9% of excess over $100,000	$4,850 + 7.93% of excess over $100,000
$250,000+	$19,000 + 9.8% of excess over $250,000	$16,745 + 8.64% of excess over $250,000

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Table 3 presents the static estimates for each tax change, with the increase in sales taxes expected to raise about $477 million in revenue, and the combined cuts to corporate and personal income taxes lowering revenue by $477 million.

Table 3: Static Revenue Change for Scenario 1

	Static Revenue Change (in millions)
Increase Sales Tax by One Cent	$477
Offset Portion of Personal Income Tax	-$423
Offset Portion of Corporate Income Tax	-$54
Total Change	**$0**

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Static estimates, however, do not incorporate economic responses (*e.g.*, changes to business decisions and household behaviors) to the tax changes. Our dynamic scoring model incorporates and accounts for such changes and analyzes how tax policy changes will impact government revenues, economic activity, job creation, and business investment.

Table 4 presents the dynamic effects of Scenario 1 and reveals that these policy changes will lead to $250 million in state gross domestic product (GDP) growth in the first year. With the increased economic activity, the state will gain back about $40 million in revenue in the first year, even though the static revenue estimate of the combined proposals would be $0. Because Scenario 1 increases and decreases taxes that directly affect families, there is no substantial change in work activity. But with increased take-home pay, families can buy more of the things they want and need. On the corporate side, lower corporate taxes will spur approximately

$170 million more business investment than expected by the fourth year of the reform.

Table 4: Effects of Increase Sales Tax by One Cent with Offset by Static Revenue-Neutral Reduction in Income Taxes[47]

	Baseline				
Year	GDP	Employment	Tax Revenue	Consumption	Investment
2020	$182,502	1,651	$8,722	$101,205	$38,856
2021	$185,409	1,669	$8,858	$102,064	$39,432
2022	$188,363	1,679	$8,987	$103,033	$39,969
2023	$191,550	1,681	$9,119	$104,099	$40,463
2024	$194,983	1,681	$9,253	$105,230	$41,080
2025	$198,477	1,686	$9,389	$106,383	$41,672
2026	$201,836	1,693	$9,524	$107,468	$42,256
2027	$205,453	1,700	$9,660	$108,592	$42,901
2028	$209,134	1,706	$9,799	$109,701	$43,555
2029	$212,882	1,712	$9,945	$110,781	$44,237
	Difference from Baseline				
Year	GDP	Employment	Tax Revenue	Consumption	Investment
2020	$250	0	$40	$50	$230
2021	$280	0	$40	$50	$190
2022	$290	0	$50	$50	$170
2023	$300	0	$50	$60	$170
2024	$310	0	$50	$60	$170
2025	$320	0	$50	$60	$170
2026	$320	0	$50	$60	$170
2027	$330	0	$50	$60	$170
2028	$330	0	$50	$60	$170
2029	$340	0	$50	$60	$180

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[47] Source: The Economic Research Center's dynamic scoring model. Note: GDP, tax revenues, consumption and investment in millions of 2012 dollars. Employment is full-time equivalent non-farm jobs, in thousands of jobs. Difference from Baseline results are rounded to the nearest $10 million for GDP, tax revenue, consumption and investment and are rounded to the nearest thousand for employment.

Scenario 2: Economic Growth $250 Million, Taxpayer Savings $132 Annually

Iowa should meet the designated revenue "triggers" in the state's 2018 tax reform legislation. If and when each trigger is met, Iowa's individual income tax regime will adopt the federal definition for "taxable income" so that if the federal definition changes, Iowa's definition will change as well. Iowa will also implement a new set of lower income taxes in 2023. Achieving these revenue triggers and reducing income taxes will keep Iowa fiscally stable for the foreseeable future and create an opportunity to further reform its tax policy with even lower individual income taxes and a revenue-neutral, one-cent sales tax increase in 2024.

Scenario 2 analyzes the effect of reducing personal income taxes to a more competitive, pro-growth level, while increasing the sales tax rate to offset lost revenue. The proposed personal income tax reform would keep the new four bracket system under the 2023 reform and lower the rates proportionately so that the top rate would be 5.59 percent. (See Table 5.)

Table 5: Personal Income Tax Proposal

Iowa Taxable Income	2023 Bracket Rates	Proposed Policy for 2024
$0-$6,000	4.40% of excess over $0	3.79% of excess over $0
$6,001 to $30,000	$264 + 4.82% of excess over $6,000	$227.15 + 4.15% of excess over $6,000
$30,001 to $75,000	$1,420.80 + 5.70% of excess over $30,000	$1,222.51 + 4.90% of excess over $30,000
$75,000+	$3,985.80 + 6.50% of excess over $75,000	$3,429.52 + 5.59% of excess over $75,000

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On top of the tax savings from fully implementing the 2018 tax reform legislation, the additional changes examined in this proposal would save Iowa taxpayers on average $132 more annually.[48]

[48] The increase in sales taxes would be $204 on average from the one cent increase, while tax savings from the income tax cut would be $325 on average.
Table 3114. Midwestern region by income before taxes: Average annual expenditures and characteristics, Consumer Expenditure Survey, 2017-2018, bls.gov (Last visited November 26, 2019); For households making between $50,000 and $69,999. In 2019, Iowa's median household income was $68,718, **Median Household Income in Iowa**, fred.stlouisfed.org (Last visited November 26, 2019); amount of sales tax paid is computed according to: Barbara Johnson-Cox, "**Sales Tax in CE Data**," bls.gov (Last visited November 26, 2019).

The static model estimates that the proposed income tax reduction will reduce revenue by $477 million. But with the six percent state sales tax, a one-cent sales tax increase would offset the lost revenue.[49] (See Table 6.)

Table 6: Static Revenue Change for Scenario 2

	Static Revenue Change (in millions)
Pro-Growth Personal Income Tax Reform	-$477
Increase Sales Tax by One Cent	$477
Total Change	**$0**

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These additional tax reforms will build on the success of the 2018 policy changes and make Iowa even more prosperous in the long run.[50] Under Scenario 2, state GDP would grow by more than $250 million more than expected in the first year; household consumption and business investment would exceed expectations by $60 million and $160 million, respectively; and the government would receive approximately $50 million more revenue than expected in the first year due to economic growth. (See Table 7.)

These results assume that the revenue triggers in the 2018 tax reform legislation are in fact met. That assumption, however, is not guaranteed. An economic slowdown could thwart the "baseline" trigger of at least four percent growth in revenues from fiscal year 2021 to fiscal year 2022, and revenues could struggle to reach the necessary "benchmark" triggers, postponing further reform. But recent fiscal responsibility allows Iowa the opportunity to implement responsible reform safely, especially if it includes other suitable tax adjustments to ensure budget stability. The next two scenarios demonstrate the impact and benefits of pro-growth reforms on families, businesses, and the overall economy.

[49] There are other means to raise $477 million to offset the lost revenue from the income tax cut other than a strict sales tax rate increase. Broadening the sales tax base of goods and services subject to taxation would increase sales tax revenue as well without the need for increasing the sales tax rate.
[50] The impact of this scenario does not begin until 2024. The baseline values are modified to account for full implementation of the 2018 tax reform bill through 2023.

Table 7: Effects of Tax Reform Starting in 2024: Further Personal Income Tax Rate Cuts Offset by Static Revenue Neutral Sales Tax Increase[51]

	Baseline				
Year	GDP	Employment	Tax Revenue	Consumption	Investment
2020	$182,502	1,651	$8,752	$101,205	$38,856
2021	$185,409	1,669	$8,889	$102,064	$39,432
2022	$188,363	1,679	$9,027	$103,033	$39,969
2023	$191,980	1,683	$8,716	$104,289	$40,743
2024	$195,453	1,683	$8,850	$105,420	$41,310
2025	$198,967	1,688	$8,978	$106,573	$41,882
2026	$202,336	1,695	$9,109	$107,658	$42,456
2027	$205,963	1,702	$9,246	$108,792	$43,101
2028	$209,654	1,708	$9,375	$109,901	$43,755
2029	$213,412	1,714	$9,507	$110,981	$44,437
	Difference from Baseline				
Year	GDP	Employment	Tax Revenue	Consumption	Investment
2020	$0	0	$0	$0	$0
2021	$0	0	$0	$0	$0
2022	$0	0	$0	$0	$0
2023	$0	0	$0	$0	$0
2024	$250	0	$50	$60	$220
2025	$320	0	$50	$60	$180
2026	$320	0	$50	$60	$170
2027	$330	0	$50	$60	$160
2028	$330	0	$50	$60	$160
2029	$340	0	$50	$60	$160

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[51] The baseline values for GDP, taxes, consumption, and investment were modified based on the assumption that the revenue triggers were met to implement the new 2023 personal income tax brackets and rates. Starting in 2023, the baselines are also modified to account for implementation of the new personal income tax brackets and rates.
Source: The Economic Research Center's dynamic scoring model. Note: GDP, tax revenues, consumption and investment in millions of 2012 dollars. Employment is full-time equivalent non-farm jobs, in thousands of jobs. Difference from Baseline results are rounded to the nearest $10 million for GDP, tax revenue, consumption and investment and are rounded to the nearest thousand for employment.

Scenario 3: Economic Growth $610 Million, Taxpayer Savings $1,249 Annually

A more robust pro-growth tax reform policy would implement some of the changes from the 2018 reform legislation now, rather than waiting, and thereby reduce distortionary income taxes and accelerate economic growth. Iowa's 2018 reform conditioned a streamlined personal income tax system on achieving certain revenue triggers down the road in order to avoid budget shortfalls. But if a slight sales tax increase could offset the cost of such reforms, then they could be enacted now and provide more immediate benefits to families and businesses.

Scenario 3 shows the effect of reducing personal and corporate income taxes, and increasing the sales tax rate to offset lost state revenue. The new personal income tax bracket would match the new brackets expected with the revenue trigger in 2023, but the rates would apply for tax year 2020 and the top rate would be 5.5 percent and the marginal rates for the other brackets reduced proportionally. (See Table 8.) Similarly, the corporate income tax rates would be reduced proportionally and the top rate would be six percent. (See Table 9.)

Table 8: Personal Income Tax Proposal

Iowa Taxable Income	Proposed Policy
$0-$6,000	3.72% of excess over $0
$6,001 to $30,000	$223.38 + 4.08% of excess over $6,000
$30,001 to $75,000	$1,202.22 + 4.82% of excess over $30,000
$75,000+	$3,372.60 + 5.50% of excess over $75,000

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Table 9: Corporate Income Tax Proposal (2021 brackets)

Iowa Taxable Income	Current Law	Proposed Policy
$0-$100,000	5.5% of excess over $0	3.37% of excess over $0
$100,001-$250,000	$5,500 + 9% of excess over $100,000	$3,370 + 5.51% of excess over $100,000
$250,000+	$19,000 + 9.8% of excess over $250,000	$11,635 + 6.0% of excess over $250,000

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The static model estimates personal and corporate income tax reductions costing Iowa more than $1.2 billion in revenue. That lost revenue requires an offsetting increase in other, less distortionary taxes (*e.g.*, sales taxes) to keep the state budget balanced. The state's current six percent sales tax would require raising the sales tax by 2.5 cents to offset revenue losses from the income tax reforms, holding current sales tax exemptions unchanged.

Even with a 2.5-cent sales tax increase, households would have more post-tax money under Scenario 3. After raising the rate 2.5 cents, the typical Iowa household would pay an average of $511 more per year in sales taxes.[52] The cost of such sales tax increases, however, are exceeded by the decrease in income taxes under the proposed reform. The typical Iowa taxpayer would expect to save $1,760 annually in income taxes. Combined, the net savings of the proposal would be an average of $1,249 annually.

Currently, Iowa exempts many goods and services from sales taxes, which reduces the size of the sales tax base. In 2015, for example, Iowa forfeited $840.2 million by not taxing food, gambling boat games and admissions, and solar energy equipment. Taxes on those goods (excluding SNAP purchases) would have generated $435.6 million, $402 million, and $2.6 million for the state, respectively. Likewise, Iowa only taxes certain enumerated services.[53] Taxing virtually all services—with only limited exceptions—would promote a fairer tax climate for businesses, not benefiting one industry over another. Iowa's narrower goods and services tax base means that tax rates must be higher in order to make-up for lost funds and generate sufficient revenue.[54] Furthermore, the narrower base creates a regressive tax environment that benefits some industries at the expense of others and harms low-income households more than high-income households. A broader tax base, by contrast, lowers the tax rate for everyone while still allowing the state to collect the same revenue.

The 2018 tax reform took a small step toward broadening the sales tax base by including photography services and digital goods, but room for improvement

[52] **Table 3114. Midwestern region by income before taxes: Average annual expenditures and characteristics, Consumer Expenditure Survey, 2017-2018**, bls.gov (Last visited November 26, 2019); For households making between $50,000 and $69,999. In 2019, Iowa's median household income was $68,718, **Median Household Income in Iowa**, fred.stlouisfed.org (Last visited November 26, 2019); amount of sales tax paid is computed according to: Barbara Johnson-Cox, "**Sales Tax in CE Data**," bls.gov (Last visited November 26, 2019).
[53] **2015 Iowa Tax Expenditures: Initial Release**, Iowa Department of Revenue, December 31, 2015.
[54] ***Tax Policy Nuts and Bolts: Understanding the Tax Base and Tax Rate***, Institute on Taxation and Economic Policy, August 2011.

remains. According to the Iowa Department of Revenue, the state would have collected $445 million more in 2015 if it taxed a wider assortment of consumer services.[55]

Rather than raise the sales tax rate, Iowa could raise $1.2 billion by applying it more consistently. Eliminating some or all of the exemptions would broaden the sales tax base and increase tax revenue—a more pro-growth strategy than raising rates.[56] According to recent government estimates, Iowa could increase sales tax collections by more than $1 billion just by eliminating one tenth (16 out of 170) of its current sales tax expenditures.[57]

Table 10 lists some sales tax-exempted goods and services and their lost revenue values from the 2015 Iowa Department of Revenue report. Many of the listed services are used disproportionately by higher-income households, so broadening the sales tax base to include those services would benefit more middle- and lower-income households that would receive large income tax cuts with little change in their sales tax burdens.[58] The 2018 tax reform broadened the sales tax base to pay for tax cuts by removing the exemption for some of these services. Yet, base broadening by eliminating more of these exemptions will make further tax reform possible without raising sales tax rates.

[55] Accounting and Bookkeeping Services-$14.1 million, Architectural and Engineering Services-$2.6 million, Dental Services-$59.8 million, Fishing and Hunting Guide Services-$500,000, Legal Services-$19.4 million, Marina Services-$2 million, Massage Therapy-$7.9 million, On-Line Computer Service-$49.1 million, Tax Return Preparation Services-$2.9 million, Transportation Services and Delivery Charges-$320.7 million, Veterinary Products and Services-Small Animal-$15.3 million.

[56] Jared Walczak, ***2020 State Business Tax Climate Index***, Tax Foundation, October 22, 2019.

[57] As the Department of Revenue points out, some of the items on that list are not true tax expenditures because they are intended to avoid double-taxing business inputs, consistent with sound policy. The Department report lists specifically which items on the expenditure list avoid such double-taxation; **2015 Iowa Tax Expenditures: Initial Release**, Iowa Department of Revenue, December 31, 2015; Jared Walczak, ***2020 State Business Tax Climate Index***, Tax Foundation, October 22, 2019.

[58] To achieve a large income tax cut where the rates would be brought down further would require a higher sales tax rate increase, larger base broadening, or a combination of the two to ensure the tax cuts would be paid for and a balanced budget could be maintained; Nicole Kaeding, ***Sales Tax Base Broadening: Right-Sizing a State Sales Tax***, Tax Foundation, October 24, 2017.

Table 10: Revenue Lost to Major Tax Expenditures

Tax Expenditure	Description	Lost Revenue
Gambling Boat Games and Admissions	Sales by licensees authorized to operate excursion gambling boats for (1) charges for admission to excursion gambling boats and (2) gross receipts from gambling games authorized by the Iowa Racing and Gaming Commission and conducted on excursion gambling boats are exempt from sales and use tax.	$402,000,000
Transportation Services and Delivery Charges	Transportation services, including the transportation of people, and delivery charges are exempt from sales and use tax when they are separately contracted in writing. If no written contract exists, the charges are not subject to sales and use tax if the bill itemizes the charges. The exemption does not apply to the services of transporting electrical energy or natural gas or to the rental of recreational vehicles or boats. Chartered air services are not included in the estimate.	$320,700,000
Information Services	The sale or rental of information services is exempt from sales and use tax. An information service is every business activity, process, or function by which a seller or its agent accumulates, prepares, organizes or conveys data, facts, knowledge, procedures and like services to a buyer or its agent of such information through any tangible or intangible medium. Database files, mailing lists, subscription files, market research, credit reports, surveys, real estate listings, bond rating services, wire services, and scouting reports are some examples of information services.	$74,900,000
Dental Services	Services performed by dentists are not listed as enumerated taxable services; these services are thus not taxable.	$59,800,000
Legal Services - Consumer	Legal services are not listed as an enumerated taxable service; these services are thus nontaxable.	$19,400,000
Veterinary Products and Services - Small Animal	Veterinary services are not an enumerated taxable service and thus are not subject to sales and use tax. The exemption does not apply to food, drugs, medicines, bandages, dressings, serums, and tonics used in the treatment of pets or animals for hobby purposes or any sales of tangible property or enumerated service that are	$15,300,000

Tax Expenditure	Description	Lost Revenue
	not part of professional veterinary services, such as pet grooming.	
Accounting and Bookkeeping Services - Consumer	Accounting and bookkeeping services are not listed as an enumerated taxable service; these services are thus nontaxable.	$14,100,000
Massage Therapy	Massage therapy services provided by massage therapists licensed under Iowa Code 152C is exempt from sales and use tax.	$7,900,000
On-Line Computer Service – Consumer	The furnishing of any contracted on–line service is exempt from sales and use tax if the information is made available through a computer server. The exemption applies to all contracted on–line services, as long as they provide access to information through a computer server.	$49,100,000
Tax Return Preparation Services - Consumer	Tax return preparation services are not listed as an enumerated taxable service; these services are thus nontaxable.	$2,900,000
Architectural and Engineering Services - Consumer	Architectural and engineering services are not listed as enumerated as taxable services; these services are thus nontaxable.	$2,600,000
Solar Energy Equipment	Solar energy equipment is exempt from Iowa sales and use tax. Solar energy equipment means equipment that is primarily used to collect and convert incident solar radiation into thermal, mechanical, or electrical energy or equipment that is primarily used to transform such converted solar energy to a storage point or to a point of use.	$2,600,000
Marina Services	Marina services are not listed as an enumerated taxable service; these services are thus nontaxable.	$2,000,000

Tax Expenditure	Description	Lost Revenue
Fishing and Hunting Guide Services	Fishing and hunting guide services are not listed as an enumerated taxable service; these services are implicitly exempt from sales and use tax.	$500,000
Wind and Hydroelectric Energy Conversion	Wind and hydroelectricity energy conversion property and materials used to manufacture, install, or construct wind and hydroelectricity conversion property used as an electric power source are exempt from the sales and use tax. This includes but is not limited to wind chargers, windmills, turbines, tower and electrical equipment, pad mount transformers, power lines, substations, generators, powerhouses, intakes, coffer dams, walls, water conduit, tailrace, any other concrete components, poles, wires, transformers, breakers, and switches used to convert wind energy or water, water power, or hydroelectricity to a form of usable energy.	$24,400,000
Funeral Homes and Funeral Services	Certain goods sold and services performed by funeral homes are exempt from the sales and use tax.	$7,500,000
	Total	**$1,005,700,000**

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Table 11 shows the static revenue change for each component of the proposal.

Table 11: Static Revenue Change for Scenario 3

	Static Revenue Change (in millions)
Pro-Growth Personal Income Tax Reform	-$1,064
Pro-Growth Corporate Income Tax Reform	-$154
Revenue Neutral Increase in Sales Taxes (Either Base Broadening or Rate Increases)	$1,218
Total Change	**$0**

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Scenario 3's pro-growth income tax reforms—even with a sales tax increase—spur greater economic activity ($610 million more than expected in GDP by 2020) and allow Iowans to keep more of their hard-earned income. (See Table 12.) This scenario also shows a dynamic $80 million increase in tax revenues by 2022. Although components of the 2018 tax reform will improve Iowa's income tax policy overall, some household and business tax credits persist in benefitting some select Iowans at the expense of others. Broadening the income tax bases on households and businesses would allow a smaller sales tax increase to cover lost revenue.

Table 12: Effects of Pro-Growth Income Tax Reform with Offsetting Sales Tax Increase[59]

	Baseline				
Year	GDP	Employment	Tax Revenue	Consumption	Investment
2020	$182,502	1,651	$8,722	$101,205	$38,856
2021	$185,409	1,669	$8,858	$102,064	$39,432
2022	$188,363	1,679	$8,987	$103,033	$39,969
2023	$191,550	1,681	$9,119	$104,099	$40,463
2024	$194,983	1,681	$9,253	$105,230	$41,080
2025	$198,477	1,686	$9,389	$106,383	$41,672
2026	$201,836	1,693	$9,524	$107,468	$42,256
2027	$205,453	1,700	$9,660	$108,592	$42,901
2028	$209,134	1,706	$9,799	$109,701	$43,555
2029	$212,882	1,712	$9,945	$110,781	$44,237
	Difference from Baseline				
Year	GDP	Employment	Tax Revenue	Consumption	Investment
2020	$610	0	$70	$130	$570
2021	$680	0	$70	$130	$460
2022	$710	0	$80	$130	$420
2023	$730	0	$80	$130	$410
2024	$750	0	$80	$140	$410
2025	$770	0	$80	$140	$410
2026	$780	0	$80	$140	$410
2027	$800	0	$80	$150	$410
2028	$810	0	$80	$150	$420
2029	$820	0	$90	$150	$430

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[59] Source: The Economic Research Center's dynamic scoring model. Note: GDP, tax revenues, consumption and investment in millions of 2012 dollars. Employment is full-time equivalent non-farm jobs, in thousands of jobs. Difference from Baseline results are rounded to the nearest $10 million for GDP, tax revenue, consumption and investment and are rounded to the nearest thousand for employment.

Scenario 4: Economic Growth $450 Million, Taxpayer Savings $1,259 Annually

Scenario 4 illustrates that balancing a budget through pro-growth tax reform can include broadening the income tax base by eliminating unfair, costly credits. Better tax policy allows everyone to benefit from lower taxes rather than only those who qualify for special interest tax expenditures.[60]

This scenario models the same rate and bracket changes as Scenario 3 (Tables 8 and 9), but offsets the revenue losses from those tax cuts by eliminating some personal and corporate income tax credits, with a static value of $100 million for each type of tax.[61] A sales tax increase covers the remaining revenue shortfall and keeps the total tax change revenue neutral. The sales tax increase can be either a flat 2.1 cent rate increase, base broadening, or a combination of the two. The total static revenue impact of these reforms is $0. (See Table 13.)

Table 13: Static Revenue Change for Scenario 4

	Static Revenue Change (in millions)
Pro-Growth Personal Income Tax Reform	-$1064
Eliminate Portion of Personal Income Tax Credits	$100
Pro-Growth Corporate Income Tax Reform	-$154
Eliminate Portion of Corporate Income Tax Credits	$100
Revenue Neutral Increase in Sales Taxes (Either Base Broadening or Rate Increases)	$1,018
Total Change	**$0**

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This scenario actually benefits the average taxpayer in Iowa more relative to Scenario 3. The income tax cuts are the same as from Scenario 3 and the sales tax increase is smaller compared to Scenario 3. Cutting $100 million in income tax credits more heavily penalizes the higher-income households who receive a

[60] ***Tax Policy Nuts and Bolts: Understanding the Tax Base and Tax Rate***, Institute on Taxation and Economic Policy, August 2011.
[61] For personal income taxes, the $100 million in reduced credits were distributed according to the proportion of credits each income group receives. For example, more than 72 percent of tax credits are received by households earning $75,000 or more each year.

majority of the credits. Therefore, on net the typical Iowa taxpayer would actually receive tax savings totaling $1,259 annually.[62]

Eliminating credits for some taxpayers under this scenario shows positive, if slightly reduced, effects on households, businesses, and the economy relative to Scenario 3. State GDP would increase by $450 million above the baseline in 2020. With more household consumption and business investment, tax revenue would also increase between $80 million and $90 million above expectations. As Scenario 4 demonstrates, base broadening with lower income tax rates can benefit families and companies, and spread economic prosperity across state taxpayers. (See Table 14.)

[62] **Table 3114. Midwestern region by income before taxes: Average annual expenditures and characteristics, Consumer Expenditure Survey, 2017-2018**, bls.gov (Last visited November 26, 2019); For households making between $50,000 and $69,999. In 2019, Iowa's median household income was $68,718, **Median Household Income in Iowa**, fred.stlouisfed.org (Last visited November 26, 2019); amount of sales tax paid is computed according to: Barbara Johnson-Cox, "**Sales Tax in CE Data**," bls.gov (Last visited November 26, 2019).

Table 14: Effects of Pro-Growth Income Tax Reform with Base Broadening Offsets[63]

	Baseline				
Year	GDP	Employment	Tax Revenue	Consumption	Investment
2020	$182,502	1,651	$8,722	$101,205	$38,856
2021	$185,409	1,669	$8,858	$102,064	$39,432
2022	$188,363	1,679	$8,987	$103,033	$39,969
2023	$191,550	1,681	$9,119	$104,099	$40,463
2024	$194,983	1,681	$9,253	$105,230	$41,080
2025	$198,477	1,686	$9,389	$106,383	$41,672
2026	$201,836	1,693	$9,524	$107,468	$42,256
2027	$205,453	1,700	$9,660	$108,592	$42,901
2028	$209,134	1,706	$9,799	$109,701	$43,555
2029	$212,882	1,712	$9,945	$110,781	$44,237
	Difference from Baseline				
Year	GDP	Employment	Tax Revenue	Consumption	Investment
2020	$450	0	$80	$90	$430
2021	$500	0	$80	$90	$350
2022	$530	0	$80	$90	$320
2023	$550	0	$90	$90	$310
2024	$560	0	$90	$90	$310
2025	$570	0	$90	$100	$310
2026	$580	0	$90	$100	$310
2027	$590	0	$90	$100	$310
2028	$600	0	$90	$100	$320
2029	$610	0	$90	$100	$320

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[63] Source: The Economic Research Center's dynamic scoring model. Note: GDP, tax revenues, consumption and investment in millions of 2012 dollars. Employment is full-time equivalent non-farm jobs, in thousands of jobs. Difference from Baseline results are rounded to the nearest $10 million for GDP, tax revenue, consumption and investment and are rounded to the nearest thousand for employment.

CONCLUSION

Iowa began a necessary tax reform effort in 2018 to reduce burdensome taxes on residents and businesses. Once fully implemented, that effort promises to make Iowa a national tax policy leader, but more work remains to be done. Many of the 2018 reforms are contingent on economic conditions and future revenue targets that are far from guaranteed. Delaying the reforms for even a few more years subjects Iowa families and companies to some of the highest tax rates in the country, and hinders even greater economic growth. More immediate pro-growth income tax reforms will enable Iowa employers to investment more in their businesses and workers, allow households to keep more of their hard-earned income, and make the state more economically competitive.

Commonsense, revenue-neutral tax reforms could generate more than $800 million in economic activity, allow households to spend up to $150 million more on the goods and services they need, and spur more than $400 million in more business investment. And average tax savings would be more than $1,200 annually. Without strategic tax reforms, however, Iowa will maintain one of the highest state tax rates in the country and stymie promising economic growth and prosperity.

Iowa should take full advantage of its economic strength and recent budget surpluses to pursue pro-growth tax reforms sooner rather than later. As our dynamic economic model demonstrates, strategic tax reforms will not jeopardize the state's sound fiscal budget. Instead, adopting pro-growth strategies today will make Iowa households and businesses more prosperous, spur corporate investment, increase take-home pay, and establish the state as a national tax policy leader for years to come. State policymakers should not miss that opportunity.

APPENDIX

Appendix A: The Economic Research Center Tax Model

Economists at The Buckeye Institute's Economic Research Center have developed and maintain a dynamic scoring model to analyze how changes to tax policy impact not only government revenues but also economic output, job creation, and business investment. Unlike static models that do not account for human or market responses to policy changes, the ERC's dynamic model predicts how individuals, households, and businesses will alter their economic choices in response to changes in the private economy and public policy over time.

For this paper, the ERC calibrated the model for Iowa using publicly available state and federal data, and relied on a similar dynamic scoring framework used by federal agencies to evaluate federal tax proposals to predict how certain policy changes will affect gross domestic product, job creation or loss, and government revenue.

The ERC's model has undergone a double-blind peer review and incorporated comments from those reviews consistent with current academic standards and methodologies. The model's full technical description provided below will allow researchers to validate the model's accuracy and the conclusions that we have drawn.

The Model Framework

The ERC's dynamic model provides a framework representing a generic state economy, with its parameters calibrated to the specific state being analyzed. It allows researchers to study the interaction of households' economic choices and firms' profit maximizing decisions with a state government that pays for its budget by taxing households and businesses. The model framework is similar to those used to study national policy, modified with some conditions tailored to the specific economic conditions of a state. Because states have more limits to trade and debt relative to a national economy, for example, the ERC's model includes a condition in which state governments satisfy a budget constraint where debt cannot increase beyond a certain level. Our model is comprised of the following three parts:

1) *The Household Problem*: Households choose how much to consume and how much to work based on their preferences and their budgets. Households can also choose to take on debt or invest in capital used by

firms. Their budgets factor in sales and excise taxes on consumption, labor income (both at the state and federal level), capital income (both at the state and federal level), and licensing. The parameters governing these taxes are estimated using state and federal data.

2) *The Firm Problem*: Firms choose labor and capital, supplied by the household, to maximize profits taking the costs of production (wages, the price of capital, and taxes) as given. Using state-level data, the model simulates production within separate sectors. The output produced is used for consumption, government expenditures, or investments in factors of production.

3) *The Government Sector*: The government sets taxes to collect revenue to pay for its expenditures; however, deficits and surpluses are allowed to a limited degree. The state's trade balance is a mathematical output of what is consumed, invested in, and government expenditures less total production in the economy.

With this framework, we then explicitly define how households and firms make their economic choices.

In the model environment, time is discrete and lasts forever. In every period the economy is populated by heterogeneous households specialized in the production of one of s types of goods. The Bureau of Economic Analysis (BEA) reports macroeconomic data for the 50 states in yearly intervals, so each period represents a year in this framework. Each sector s is populated by a large number of firms specialized in the production in their sector. The economy also features a government sector that collects taxes and purchases goods from all sectors. A share $q^e \in (0,1)$ of households has earning ability $e = \{1, \dots, E\}$. These shares are such that the total population is $\sum_{e=1}^{E} q^e = 1$. The share of households with the required skills to work in sector s is $\mu_s \in (0,1)$ such that $\sum_{s=1}^{S} \mu_s = 1$. We then outline each part of the model: the household problem, the firm problem, and the government sector.

The Household Problem

The household has preferences between consumption and leisure. These preferences are represented by a period t utility function U_t, which takes the following form:

$$U_t = \sum_{s=1}^{S} \alpha_s \ln\left(c_{e,t}(s)\right) - \chi_e l_{e,t}(s)^{\left(1+\frac{1}{\psi_e}\right)}$$

Taking the prices, taxes, and previous period $t-1$ choices as given, each period t, household e chooses: how much to consume $c_{e,t}(s)$ from each sector s; the amount of future capital stock $k_{e,t}(s)$ for each sector s; investment $x_{e,t}(s)$ for each sector s; how much to borrow in debt $d_{e,t}$; and how much to work $l_{e,t}(s)$ in each sector s. Households place a utility weight on consumption goods according to $\alpha_s \in (0,1)$ where α_s represents the share of total GDP in sector s. Period time is split between labor and leisure such that total time is normalized to 1. Leisure $h_{e,t}$ can be defined as:

$$h_{e,t} = 1 - \sum_{s=1}^{S} l_{e,t}(s)$$

where $h_{e,t} \in [0,1]$ and $l_{e,t}(s) \in [0,1]$. The parameter that regulates the Frisch elasticity of labor supply is denoted ψ_e. χ_e is a scaling factor that helps match hours worked observed in the data. The household seeks to maximize its utility by solving the following problem:

$$V_{e,t}(s) = \max_{c_{e,t}(s), x_{e,t}(s), l_{e,t}(s), k_{e,t}(s), d_{e,t}} U\left(c_{e,t}\right) - \chi_e l_{e,t}(s)^{\left(1+\frac{1}{\psi_e}\right)} + \beta E[V_{e,t+1}(s)]$$

The economic decisions for period t are subject to the following constraints:

$$\begin{aligned} d_{e,t} = (1+\tau_t^c+\tau_t^{ex}) \sum_{s=1}^{\square} c_{e,t}(s) + \sum_{s=1}^{S} x_{e,t}(s) + \left(1+i_{r,t-1}\right) d_{e,t-1} + \tau_t^k \sum_{s=1}^{S} k_{e,t-1}(s) \\ + \left[\frac{\phi}{2}\left(\sum_{s=1}^{S} k_{e,t}(s) - \sum_{s=1}^{S} k_{e,t-1}(s)\right)^2\right] - \left(1-(1-\eta_{e,t}^{i,n})\tau_{e,t}^{i,n} - \tau_t^o\right. \\ \left. - \tau_{e,t}^{i,n,f}\right) \sum_{s=1}^{S} w_{e,t}(s) l_{e,t}(s) - \left(1-(1-\eta_{e,t}^{i,r})\tau_{e,t}^{i,r} - \tau_t^o - \tau_{e,t}^{i,r,f}\right. \\ \left. - \tau_t^{corp}\right) \sum_{s=1}^{S} r_{e,t}(s) k_{e,t-1}(s) \end{aligned}$$

$$k_{e,t}(s) = x_{e,t}(s) + (1-\delta) k_{e,t-1}(s)$$

$$c_{e,t}(s) \geq 0$$

$$k_{e,t}(s) \geq 0,\ k_{e,t+1}(s) = 0$$

$V_{e,t}(s)$ defines expected utility discounted at a patient factor $\beta \in [0,1]$. As in Mendoza (1991), ϕ denotes a capital adjustment cost. The return on capital lent to firms is $r_{e,t}(s)$. The wage paid to workers of type e in sector s is $w_{e,t}(s)$. Future

capital stock $k_{e,t}(s)$ is the sum of current capital stock $k_{e,t-1}(s)$, accounting for depreciation δ, and investment $x_{e,t}(s)$. $i_{r,t}$ denotes the interest rate at which domestic residents can borrow from international markets in period t, and $d_{e,t}$ is household debt.

Following Schmitt-Grohé and Uribe (2003), we assume a debt elastic interest rate. This is modeled as $i_{r,t} = i_{r,w} + \zeta(e^{D_t - D} - 1)$ where $i_{r,w}$ is the world interest rate faced by domestic agents and is assumed to be constant and ζ and D are constant parameters that are calibrated to match the state's economy. $\zeta(e^{D_t - D} - 1)$ is the state specific interest rate premium that increases with the level of debt. D_t represents the aggregate state level of debt, such that $D_t = \sum_{e=1}^{E} d_{e,t}$.

τ_t^c is the tax on household consumption purchases, which includes general sales tax, and τ_t^{ex} is the excise tax rate. $\tau_{e,t}^{i,n}$ is the statutory individual labor income tax rate, and $\tau_{e,t}^{i,r}$ is the individual capital income tax rate. $\eta_{e,t}^{i,n}$ and $\eta_{e,t}^{i,r}$ are the proportions of labor income and capital income respectively that are deducted or otherwise exempt from income taxes. $\tau_{e,t}^{i,n,f}$ is the individual labor income tax collected by the federal government, and $\tau_{e,t}^{i,r,f}$ is the individual capital income tax collected by the federal government. Income tax rates depend on the individual earning ability e. τ_t^k is a tax on fixed assets owned by households. $\tau_t^{corp}$is the corporate income tax faced by the owners of capital. τ_t^o is the share of income paid to all other taxes, fees, and revenue sources for the state government not included specifically in the model.

The variables representing households' economic decisions for each period t and sector s can be summarized as the set: $\left\{\left\{c_{e,t}(s), x_{e,t}(s), l_{e,t}(s), k_{e,t+1}(s)\right\}_{s=1}^{S}, d_{e,t}\right\}_{t=0}^{\infty}$. The household then maximizes the utility function subject to the resource constraint and a no-Ponzi scheme constraint that implies that the household's debt position must be expected to grow at a rate lower than the interest rate in the long-run.

The Firm Problem

In each sector s, a large number of competitive firms produce goods according to the following constant elasticity of substitution (CES) production function:

$$y_t(s) = a_t \left(\sum_{e=1}^{E} \left((\theta_s) \left(k_{e,t-1}(s) \right)^{-\rho} + (1 - \theta_s) \left(z_e \, l_{e,t}(s) \right)^{-\rho} \right)^{-\frac{1}{\rho}} \right)$$

where a_t is total factor productivity (TFP), θ_s is associated with the capital share of total output in sector s, and $\sigma_{CES} = \frac{1}{1-\rho}$ is the constant elasticity of substitution between capital and labor. z_e is labor productivity specific to a household member's earning ability. These firms solve the following profit maximization problem:

$$\Pi_t = (1 - \tau_t^{CAT}) a_t \left(\sum_{e=1}^{E} \left((\theta_s) \left(k_{e,t-1}(s) \right)^{-\rho} + (1 - \theta_s) \left(z_e \, l_{e,t}(s) \right)^{-\rho} \right)^{-\frac{1}{\rho}} \right) - \sum_{e=1}^{E} w_{e,t}(s) l_{e,t}(s) - \sum_{e=1}^{E} r_{e,t}(s) k_{t-1}(s)$$

It is important to note that the demand for labor and capital is sector s specific. τ_t^{CAT} is a commercial activity tax, modeled as a tax on a firm's revenues.

The representative firm in sector s hires labor according to the following condition:

$$(1 - \tau_t^{CAT}) \, (1 - \theta_s) a_t \left((\theta_s) \left(k_{e,t-1}(s) \right)^{-\rho} + (1 - \theta_s) \left(z_e \, l_{e,t}(s) \right)^{-\rho} \right)^{-\frac{1}{\rho}-1} \left(z_e l_{e,t}(s) \right)^{-\rho-1} z_e = w_{e,t}(s),$$

where $w_{e.t}(s)$ is the wage rate for type e in sector s. The demand for capital is such that:

$$(1 - \tau_t^{CAT})(\theta_s) a_t \left((\theta_s) \left(k_{e,t-1}(s) \right)^{-\rho} + (1 - \theta_s) \left(z_e \, l_{e,t}(s) \right)^{-\rho} \right)^{-\frac{1}{\rho}-1} \left(k_{e,t-1}(s) \right)^{-\rho-1} = r_{e,t}(s),$$

We assume a_t follows a stationary mean zero autoregressive process of order 1 in the log, which can be represented in the following way:

$$(a_t) = \rho_A (a_{t-1}) + \epsilon_{A,t}$$

The innovation shock $\epsilon_{A,t}$ is drawn from a standard normal distribution.

The Government Sector

The government sets taxes and collects revenue to make purchases. Its contribution to the rainy-day fund RF_t is the excess of tax revenue plus federal

government transfers net of government spending added to the previous period's balance.

$$RF_t = TR_t + FF_t - g_t + \left(1 + i_{r,t}\right)RF_{t-1}$$

Deficits—negative contributions—to the rainy-day fund reduce the fund's balance.

The state government's tax revenues TR_t are given by:

$$TR_t = \sum_{s=1}^{S}\left(\sum_{e=1}^{E}\Big(\tau_t^{\mathrm{CAT}} y_{(e,t)}(s) + (\tau_t^{c} + \tau_t^{ex})c_{e,t}(s) + (1-\eta_{e,t}^{i,n})\tau_{e,t}^{i,n}\, w_{e,t}(s)l_{e,t}(s) + (1-\eta_{e,t}^{i,r})\tau_{e,t}^{i,r}\, r_{e,t}(s)k_{e,t-1}(s) + \tau_t^{k}k_{e,t-1}(s)\Big) + \tau_t^{o}\, y_t(s)\right)$$

Government spending is proportional to GDP and is specified as $g_t = \hat{g}_t y_t$. This implies that government spending is assumed to grow as the economy grows. Spending policy $\hat{g}_t$ is assumed to evolve according to:

$$\hat{g}_t = \left(1 - \rho_{g,h}\right)(\hat{g}) + \rho_{g,h}(\hat{g}_{t-1}) + \epsilon_g$$

where $\hat{g}$ is the state share of income spent by the government sector in the long-run, the steady-state equilibrium. Variables without the time subscript denote steady-state values.

The tax instruments follow the exogenous processes:

$$\tau_t^{i,n} = (1-\rho_{i,n})\tau^{i,n} + \rho_{i,n}\tau_{t-1}^{i,n} + \epsilon_{i,n}$$
$$\tau_t^{i,r} = (1-\rho_{i,r})\tau^{i,r} + \rho_{i,r}\tau_{t-1}^{i,r} + \epsilon_{i,r}$$
$$\tau_t^{c} = (1-\rho_{c})\tau^{c} + \rho_{c}\tau_{t-1}^{c} + \epsilon_{c}$$
$$\tau_t^{ex} = (1-\rho_{ex})\tau^{ex} + \rho_{ex}\tau_{t-1}^{ex} + \epsilon_{ex}$$
$$\tau_t^{corp} = (1-\rho_{corp})\tau^{corp} + \rho_{corp}\tau_{t-1}^{corp} + \epsilon_{corp}$$
$$\tau_t^{k} = (1-\rho_{k})\tau^{k} + \rho_{k}\tau_{t-1}^{k} + \epsilon_{k}$$
$$\tau_t^{o} = (1-\rho_{o})\tau^{o} + \rho_{o}\tau_{t-1}^{o} + \epsilon_{o}$$
$$\tau_t^{i,n,f} = (1-\rho_{i,n,f})\tau^{i,n,f} + \rho_{i,n,f}\tau_{t-1}^{i,n,f} + \epsilon_{i,n,f}$$
$$\tau_t^{i,r,f} = (1-\rho_{i,r,f})\tau^{i,r,f} + \rho_{i,r,f}\tau_{t-1}^{i,r,f} + \epsilon_{i,r,f}$$

$$\eta_t^{i,n} = (1-\rho_{\eta,n})\eta^{i,n} + \rho_{\eta,n}\tau_{t-1}^{i,n} + \epsilon_{\eta,n}$$
$$\eta_t^{i,r} = (1-\rho_{\eta,r})\eta^{i,r} + \rho_{\eta,r}\eta_{t-1}^{i,r} + \epsilon_{\eta,r}$$

As in Schmitt-Grohé and Uribe (2003), we write the trade balance to GDP ratio (TB) in steady-state as:

$$TB = 1 - \frac{[c + x + g]}{y}$$

The Competitive Equilibrium

A competitive equilibrium is such that given the set of exogenous processes, households solve the household utility maximization problem, firms solve the profit maximization problem, and the capital and labor markets clear.

The Deterministic Steady-State

The characterization of the deterministic steady state is of interest for two reasons. First, the steady-state facilitates the calibration of the model. This is because the deterministic steady-state coincides with the average position of the model economy to a first approximation. Because of this, matching average values of endogenous variables to their observed counterparts (e.g., matching predicted and observed average values of the labor share, the consumption shares, or the trade-balance-to-output ratio) can reveal information about structural parameters that can be used in the calibration of the model. Second, the deterministic steady-state is often used as a convenient point around which to approximate equilibrium conditions of the stochastic economy (see Schmitt-Grohe and Uribe, 2003). For any variable, we denote its steady-state value by removing the time subscript.

Using the solution from the households' and firms' choice problems, the steady-state implies that:

$$1 = \beta\left[\left(1 - (1-\eta_e^{i,r})\tau_e^{i,r} - \tau^o - \tau_e^{i,r,f} - \tau^{corp}\right)r_e(s) + 1 - \delta - \tau^k\right]$$
$$y(s) = a\left(\sum_{e=1}^{E}\left((\theta_s)\left(k_e(s)\right)^{-\rho} + (1-\theta_s)\left(z_e\, l_e(s)\right)^{-\rho}\right)^{-\frac{1}{\rho}}\right)$$
$$(1-\tau^{CAT})a\left[\theta_s\left(\frac{k_e(s)}{l_e(s)}\right)^{-\rho} + (1-\theta_s)z_e^{-\rho}\right]^{-\frac{1}{\rho}-1}\theta_s\left(\frac{k_e(s)}{l_e(s)}\right)^{-\rho-1} = r_e(s)$$

These expressions deliver the steady-state capital-labor ratio, which we denote $\omega_e(s)$

$$\omega_e(s) \equiv \frac{k_e(s)}{l_e(s)} = (1-\theta_s)^{-\frac{1}{\rho}}(z_e)\left(\frac{\beta^{-1}-1+\delta+\tau^k}{a(1-\tau^{CAT})\theta_s\left(1-(1-\eta_{e,t}^{i,r})\tau_e^{i,r}-\tau^o-\tau_e^{i,r,f}-\tau^{corp}\right)}-\theta_s\right)^{\frac{1}{\rho}}$$

The steady-state level of capital is:

$$k_e(s) = \omega_e(s) l_e(s)$$

Finally, the steady-state level of consumption can be obtained by evaluating the resource constraint at the steady-state:

$$\sum_{e=1}^{E} c_e(s) = y(s) - \delta \sum_{e=1}^{E} k_e(s) - g\mu_s - TBy(s)$$

which implies: $y = c + x + g + TBy$

As for the parameter that dictates households' preference for leisure:

$$\chi_e = \frac{\alpha_s}{(1+\tau^c+\tau^{ex})c_e(s)} \times \frac{(1-(1-\eta_{e,t}^{i,n})\tau_e^{i,n}-\tau^o-\tau_e^{i,n,f})w_e(s)}{\left(1+\frac{1}{\psi_e}\right) l_e(s)^{\frac{1}{\sigma_e}}}$$

Data and Calibration

Our data for calibrating the model come from publicly available federal and state data sources. First, we present our sources for the model's output variables. Then we present the sources for the model parameters and our empirical methodology for calibrating the model.

Output Variables

Primarily, we utilize BEA Regional Economic Accounts for Iowa for our output. All GDP variables are reported in real (2012 dollars) per capita terms using the U.S. GDP deflator reported by the BEA and, if not declared otherwise, we refer to the period of 1963-2017.

Our GDP projections use the latest GDP values for the state and apply projected growth rates for each year based on the product of a Congressional Budget Office

(CBO) forecast of the national economy and average ratio of GDP between the state and the country from 1990 to 2017.[64]

For our measure of consumption, consumption expenditures on durable goods are subtracted from total personal consumption expenditures (PCE). We consider durable goods as investment goods, as is standard in the macroeconomics literature. The values for PCE are not available on the state-level prior to 1997.

We therefore use the long-run average share of consumption in GDP to obtain the level of consumption for each year from 1963-1997. Because the BEA does not report private fixed investment at the state level, we use the U.S. share of non-residential investment in GDP from the BEA, and multiply it by the state GDP to estimate non-residential gross investment. The sum of non-residential investment and consumption expenditures on durable goods represents our measure of investment. Our methodology excludes residential investment from our measure of investment (residential investment is excluded from GDP as well).

We base our employment data for the number of non-farm jobs on data from the Bureau of Labor Statistics. We calculate the employment shares per sector using data from the BEA Regional Economic Accounts. We took the average weekly hours worked from the Annual Social and Economic Supplement of the Current Population Survey. The average weekly hours worked at all jobs is divided by the total number of hours per week (168 hours) to calculate average labor supply used for the model calibration. For the baseline projections, employment is assumed to grow at the forecasted rates of employment from the CBO.[65]

We used the following methodology to estimate the effects of the tax policy scenarios on employment because the model measures employment in hours worked (intensive margin). First, we use employment multiplied by the average hours worked per year (2,102 hours). This total number of hours worked per year is multiplied by the effect of the corresponding scenario in order to obtain the change in total hours worked for each scenario. Finally, the change in hours is converted into the number of full-time equivalent jobs gained or lost by dividing it by 2,080, which is the number of hours worked by a full-time equivalent employee according to the CBO's definition (Harris and Mok, 2015).[66]

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[64] **10-Year Economic Projections, January 2019**, CBO.gov (Last visited November 12, 2019).
[65] *Ibid.*
[66] Edward Harris and Shannon Mok, **How CBO Estimates the Effects of the Affordable Care Act on the Labor Market**, working paper, Congressional Budget Office, Working Paper 2015-09, December 2015.

Model Parameters and Calibration

Typically, a calibration assigns values to the model parameters by matching first and second moments of the data that the model aims to explain. We utilize moments in state and federal data to estimate the model parameters.

Because depreciation data are not reported at the state level by the BEA, we refer to data for the U.S. economy. The sum of current cost depreciation in nonresidential private fixed assets and consumer durable goods is divided by the sum of current cost net stock of nonresidential private fixed assets and consumer durable goods for the years 1963-2015. The average over this period represents the depreciation rate in our model. The depreciation rate of capital is $\delta = 0.1$.

The world interest rate is $i_{r,w} = 0.04$, based on the difference between the nominal interest rate for three-month treasury bill and the GDP deflator.

To compute the sector-specific labor shares, we use data from the BEA Regional Income Division. Similar to Gomme and Rupert (2004), we divide the compensation of employees by the personal income for each sector.[67] As personal income is not available for sectors, we construct it by multiplying the earnings per sector by the total economy's personal income-to-earnings ratio, which is from the BEA Regional Income Division. The capital share is simply one minus the labor share. The values refer to the years 2013-2018. The sector specific parameter θ_s is set to match the observed average labor shares for each of the $S = 9$ production sectors.[68] In the present model, the labor share is given by the ratio of labor income to output which is $1 - \theta_s$ at all times. To ensure that capital and investment are not being overstated (or understated), the parameter ν, a cost on holding capital, is applied to adjust the steady state rental rate of capital, calibrating it to match the state's investment share of GDP.[69]

The earning ability for household types is based on the distribution of income and population as reported in the Iowa Department of Revenue individual income tax annual report for Tax Year 2017.[70]

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[67] Paul Gomme and Peter Rupert, **Measuring Labors Share of Income**, working paper, Federal Reserve Bank of Cleveland, Policy Discussion Paper number 04-07, November 2004.

[68] See complete list of sectors in Appendix B.

[69] The holding cost of capital is incorporated mathematically in the following way to steady state rental rate of capital: $r^*_{e,s} = \frac{\frac{1}{\beta}+\tau^k_e+\nu-(1-\delta)}{(1-(1-\eta^{i,r}_{e,t})\tau^{i,r}_e-\tau^{i,r,f}_e-\tau^{co}-\tau^s_s-\tau^o)}$.

[70] ***2017 Iowa Individual Income Tax Annual Statistical Report***, Iowa Department of Revenue, May 2019.

- Earning ability 1 has an adjusted gross income (AGI) of up to $20,000 per year;
- Earning ability 2 has an AGI from $20,000 to $50,000;
- Earning ability 3 has an AGI from $50,000 to $75,000;
- Earning ability 4 has an AGI from $75,000 to $100,000;
- Earning ability 5 has an AGI from $100,000 to $150,000;
- Earning ability 6 has an AGI from $150,000 to $200,000;
- Earning ability 7 has an AGI from $200,000 to $250,000;
- Earning ability 8 has an AGI from $250,000-$500,000;
- Earning ability 9 has an AGI from $500,000 to $1,000,000; and
- Earning ability 10 has an AGI of more than $1,000,000 per year.

The share of household members by earning ability, q^e, is the share of returns per earning ability group. The labor productivity per earning ability, z_e, is the income per return for each earning ability with the labor productivity for group 1 being normalized to one. We take our Frisch elasticity estimate $\psi_e = 0.4$ from Reichling and Whalen (2012).[71] The parameter D is set to match the observed average trade-balance to output ratio since $TB = i_{r,w}\frac{D}{y}$. We estimate tax rates similar to the methodology used by McDaniel (2007).[72]

The full list of parameters is included in Appendix B.

[71] Felix Reichling and Charles Whalen, **Review of Estimates of the Frisch Elasticity of Labor Supply**, working paper, Congressional Budget Office Working Paper 2012-13, October 2012.
[72] A complete explanation of the methodology is included in Appendix B; Cara McDaniel, **Average tax rates on consumption, investment, labor, and capital in the OECD 1950-2003**, working paper, March 2007.

Appendix B: Tax Model Parameters

Tax Rate Estimates

The state tax rates calculated in this paper are average Iowa tax rates. The general strategy employed is as follows. First, total income is categorized as labor income or capital income and private expenditures are categorized as consumption or investment. Second, tax revenues are classified as revenues generated from taxes on labor income, capital income, private consumption expenditures, or private investment. To find a given tax rate, we divide each category of tax revenue by the corresponding income or expenditure. Since we compute tax rates in the same fashion each year, we drop time subscripts for the rest of this section.

Data on tax revenues come from U.S. Census Bureau Survey of State Government Tax Collections (STC) and the Iowa Department of Revenue individual income tax annual report for Tax Year 2017.[73] Data on income and expenditures come from regional BEA data. In any given year, total tax revenues collected by the government are the sum of taxes on production and imports (TPI), social security contributions, direct taxes on households (HHT), and direct taxes on corporations. The following sections detail the steps we take to categorize these tax revenues and calculate average tax rates.

Share of the Income Tax that Falls on Labor

The average tax rate on labor income is found by dividing labor income tax revenues by economy-wide total wage and salary labor income. To compute the labor income tax rate, we calculate labor income tax revenues and labor income. Labor income tax revenues come from two sources: the household income tax and social security taxes. However, household income taxes represent taxes on total income. Since only a portion of this income is generated from labor, only a portion of these taxes reflects taxes on labor income.

Unfortunately, the STC and BEA do not break down household income taxes according to type of income. For this reason, papers calculating average tax rates on labor and capital income based on aggregate data, such as Mendoza et al.

[73] **2017 Annual Survey of State Government Tax Collections Detailed Table**, U.S. Department of Commerce, U.S. Census Bureau (Last visited January 14, 2019); and ***2017 Iowa Individual Income Tax Annual Statistical Report***, Iowa Department of Revenue, May 2019.

(1994), assume that the tax rate on household labor income is the same as the tax rate on household capital income.[74] We make the same assumption.

The federal income tax rate is found by dividing total federal taxes on income of the household, $FHHT$, by total household income in each period. Household income is defined as gross domestic product less net taxes on production and imports, or $GDP - (TPI - Sub)$. The household income tax rate is therefore measured as:

$$\tau^{i,f} = \frac{FHHT}{GDP - (TPI - Sub)}$$

It remains to divide income into payment to capital and payment to labor. Let θ be the share of income attributed to capital, with the remaining (1 – θ) share attributed to labor. Total household income taxes paid on labor income are represented by

$$FHHT_L = \tau^{i,l,f}(1-\theta)\big(GDP - (TPI - Sub)\big)$$

The second source of tax revenue generated from taxes on labor income are social security taxes, *SS*. This corresponds to an exact entry in the BEA data, no further adjustment is required. Social security taxes combined with *HHTL* represent total tax revenues that are classified as taxes paid on labor income, so the average tax rate on labor income is measured as:

$$\tau^{i,n,f} = \frac{SS + FHHT_L}{(1-\theta)\big(GDP - (TPI - Sub)\big)}$$

At the state level, we calculate income tax rates for a variety of earning groups. The state income tax rate is found by dividing total state taxes on income of the household, $SHHT_e$, by total household income in each period. Household income, total state taxes on income of the household, as well as population are distributed according to the distribution reported in the Iowa Department of Revenue individual income tax annual report for Tax Year 2017.[75] Household income is defined as gross domestic product less net taxes on production and imports, or $GDP - (TPI - Sub)$. The household income tax rate is therefore measured as:

[74] Enrique G. Mendoza, Assaf Razin, and Linda L. Tesar, "**Effective tax rates in macroeconomics: Cross-country estimates of tax rates on factor incomes and consumption**," *Journal of Monetary Economics*, Volume 34, Issue 3 (December 1994) p.297-323.
[75] ***2017 Iowa Individual Income Tax Annual Statistical Report***, Iowa Department of Revenue, May 2019.

$$\tau^{i} = \frac{SHHT_{e}}{\big(GDP - (TPI - Sub)\big)_{i}}$$

It remains to divide income into payment to capital and payment to labor. Let θ be the share of income attributed to capital, with the remaining (1 – θ) share attributed to labor. Total household income taxes paid on labor income are represented by

$$SHHT_{e,i} = \tau^{i,n}(1-\theta)\big(GDP - (TPI - Sub)\big)_{i}$$

The average state tax rate on labor income is measured as:

$$\tau^{i,n} = \frac{SHHT_{e,i}}{(1-\theta)\big(GDP - (TPI - Sub)\big)_{i}}$$

Consumption and Investment Tax Rates

Revenue collected from taxes levied on consumption and investment expenditures are included in taxes on production and imports, TPI. Consumption and investment expenditures are subsidized by the amount Sub. TPI includes general taxes on goods and services, excise taxes, import duties and property taxes. The task remains to properly allocate TPI to the relevant tax revenue category. This requires the proper division of TPI across consumption and investment. TPI includes the following components: Property taxes, general taxes on goods and services, excise taxes, taxes on specific services, and taxes on the use of goods to perform activities.

Some of the taxes included in TPI fall only on consumption expenditures. Others fall on both consumption and investment expenditures. Revenue from taxes that fall on both consumption and investment expenditures are assumed to be split between consumption tax revenue and investment tax revenue according to consumption and investment share in private expenditures. Taxes that fall strictly on consumption are excise taxes and taxes on specific services, reported as select sales taxes in the STC data.

Taxes that fall on both consumption and investment are general sales and use taxes, and taxes on use of goods to perform activities, which includes motor vehicle taxes, highway taxes, license taxes, etc. These goods are used in the production of both investment goods and consumption goods, and can be calculated by subtracting select sales taxes, total income taxes, and corporation license taxes from total taxes in the STC data.

After identifying taxes that fall strictly on consumption expenditures, we calculate λ, their share of TPI. Revenue collected from taxes levied on consumption expenditures is calculated as:

$$TPI_C = \left(\lambda + (1-\lambda)\left(\frac{C}{C+I}\right)\right)(TPI - Sub)$$

Consumption expenditures are reported in the national accounts gross of taxes. Taxable consumption expenditures are then $C - TPI_c$ and the consumption tax is measured as:

$$\tau^C = \frac{TPI_C}{C}$$

Since TPI_c represents revenue from consumption taxes, the remaining portion of $TPI - Sub$ is attributed to taxes on investment.

$$TPI_X = TPI - Sub - TPI_C$$

Share of the Income Tax that Falls on Capital

As calculated previously, income paid to capital in the economy is $\theta(GDP - (TPI - Sub))$. $OSGOV$ is gross operating surplus earned by the government, and therefore is not subject to tax. Taxable capital income is therefore $\theta(GDP - (TPI - Sub)) - OSGOV$. Capital tax revenues come from the following sources: the household income tax, and taxes levied on corporate income. Federal household taxes on capital, $FHHT_K$, is then

$$FHHT_K = \tau^{i,r,f}\theta\big(GDP - (TPI - Sub)\big)$$

The federal household capital income tax rate is then

$$\tau^{i,k,f} = \frac{FHHT_k}{\theta\big(GDP - (TPI - Sub)\big) - OSGOV}$$

Federal corporate tax data (FCT) is only available at the national level, therefore we first approximate the share of corporate tax paid by Iowa.

The federal corporate tax rate is computed using national data as:

$$\tau^{CT,F} = \frac{FCT}{\theta\big(GGDP - (TPI - Sub)\big) - OSGOV}$$

As owners of corporations, households are subject to all corporate taxation. The total federal capital income tax is then:

$$\tau^{i,r,f} = \tau^{CT,F} + \tau^{i,k,f}$$

At the state level household capital income tax is

$$SHHT_{K,i} = \tau^{i,k}\left(\theta\big(GDP - (TPI - Sub)\big)_i\right)$$

Where the household income and tax burden are once again distributed according to the distribution reported in the Iowa Department of Revenue individual income tax annual report for Tax Year 2017.[76]

The state household capital income tax rate is then

$$\tau^{i,r} = \frac{\left(SHHT_{K,i} + SCT_i\right)}{\theta\big(GDP - (TPI - Sub)\big)_i - OSGOV_i}$$

[76] ***2017 Iowa Individual Income Tax Annual Statistical Report***, Iowa Department of Revenue, May 2019.

Sectors

Our model uses nine production sectors. The BEA reports GDP for each two-digit North American Industry Classification System (NAICS) industries, which we use to calculate each sector's percentage in total GDP (see Table B-4). Some of our sectors are the same as reported by the BEA, the remaining sectors are constructed by combining several NAICS industries as shown in Table B-1.

Table B-1: Definition of Sectors

Sector	NAICS Sectors
Agriculture, Forestry, Fishing, and Hunting	Agriculture, Forestry, Fishing, and Hunting
Mining	Mining
Utilities, Transportation, and Warehousing	Utilities Transportation and Warehousing
Construction	Construction
Manufacturing	Manufacturing
Trade	Wholesale Trade Retail Trade
Services	Information Finance and Insurance Professional, Scientific, and Technical Services Management of Companies and Enterprises Administrative and Waste Management Services Educational Services Arts, Entertainment, and Recreation Accommodation and Food Services Other Services
Real Estate, Rental, and Leasing	Real Estate Rental and Leasing
Health Care and Social Assistance	Health Care and Social Assistance

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Parameters

The following tables present the calibrated parameters for the model.

Table B-2: Household Parameters*

Disutility of Labor	$\chi_e = 37.8$
Real Interest Rate	$i_{r,w} = 0.04$
Annual Depreciation Rate of Capital	$\delta = 0.1$
Frisch Elasticity of Labor Supply	$\psi_e = 0.4$
Holding Cost of Capital	$\nu = 0.039$

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*The real interest rate is based on the difference between the nominal interest rate for three-month Treasury bill and the GDP deflator from 1950 to 2015 using St. Louis Federal Reserve Bank FRED data. The annual depreciation rate of capital is based on data from the BEA for the U.S. economy. It is the average of the sum of current cost depreciation in nonresidential private fixed assets and consumer durable goods divided by the sum of current cost net stock of nonresidential private fixed assets and consumer durable goods for the years 1963 to 2015. The Frisch elasticity of labor supply is based on the central estimate from Reichling and Whalen (2012).

Table B-3: Labor Productivity

Labor Productivity	Population Distribution
$z_1 = 1$	$q^1 = 0.283$
$z_2 = 3.39$	$q^2 = 0.324$
$z_3 = 6.17$	$q^3 = 0.146$
$z_4 = 8.71$	$q^4 = 0.093$
$z_5 = 12.09$	$q^5 = 0.091$
$z_6 = 17.17$	$q^6 = 0.030$
$z_7 = 22.27$	$q^7 = 0.012$
$z_8 = 33.62$	$q^8 = 0.015$
$z_9 = 67.60$	$q^9 = 0.004$
$z_{10} = 262.72$	$q^{10} = 0.002$

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Table B-4: Sector Specific Parameters

Sector	Output Share	Employment Share	Capital Share
Agriculture, Forestry, Fishing, and Hunting	$\alpha_1 = 0.060$	$\mu_1 = 0.059$	$\theta_1 = 0.847$
Mining	$\alpha_2 = 0.002$	$\mu_2 = 0.003$	$\theta_2 = 0.470$
Utilities, Transportation, and Warehousing	$\alpha_3 = 0.056$	$\mu_3 = 0.047$	$\theta_3 = 0.531$
Construction	$\alpha_4 = 0.046$	$\mu_4 = 0.064$	$\theta_4 = 0.592$
Manufacturing	$\alpha_5 = 0.209$	$\mu_5 = 0.125$	$\theta_5 = 0.480$
Trade	$\alpha_6 = 0.128$	$\mu_6 = 0.167$	$\theta_6 = 0.456$
Services	$\alpha_7 = 0.312$	$\mu_7 = 0.374$	$\theta_7 = 0.476$
Real Estate, Rental, and Leasing	$\alpha_8 = 0.113$	$\mu_8 = 0.038$	$\theta_8 = 0.690$
Health Care and Social Assistance	$\alpha_9 = 0.074$	$\mu_9 = 0.122$	$\theta_9 = 0.469$

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Table B-5: Federal Tax Parameters

Federal individual labor income tax rate for AGI 1	$\tau_1^{i,n,f} = 0.0030$
Federal individual capital income tax rate for AGI 1	$\tau_1^{i,r,f} = 0.0028$
Federal individual labor income tax rate for AGI 2	$\tau_2^{i,n,f} = 0.0354$
Federal individual capital income tax rate for AGI 2	$\tau_2^{i,r,f} = 0.0339$
Federal individual labor income tax rate for AGI 3	$\tau_3^{i,n,f} = 0.0429$
Federal individual capital income tax rate for AGI 3	$\tau_3^{i,r,f} = 0.0409$
Federal individual labor income tax rate for AGI 4	$\tau_4^{i,n,f} = 0.0477$
Federal individual capital income tax rate for AGI 4	$\tau_4^{i,r,f} = 0.0454$
Federal individual labor income tax rate for AGI 5	$\tau_5^{i,n,f} = 0.0634$
Federal individual capital income tax rate for AGI 5	$\tau_5^{i,r,f} = 0.0619$
Federal individual labor income tax rate for AGI 6	$\tau_6^{i,n,f} = 0.0634$
Federal individual capital income tax rate for AGI 6	$\tau_6^{i,r,f} = 0.0619$
Federal individual labor income tax rate for AGI 7	$\tau_7^{i,n,f} = 0.1283$
Federal individual capital income tax rate for AGI 7	$\tau_7^{i,r,f} = 0.1192$
Federal individual labor income tax rate for AGI 8	$\tau_8^{i,n,f} = 0.0944$
Federal individual capital income tax rate for AGI 8	$\tau_8^{i,r,f} = 0.0892$
Federal individual labor income tax rate for AGI 9	$\tau_9^{i,n,f} = 0.1323$
Federal individual capital income tax rate for AGI 9	$\tau_9^{i,r,f} = 0.1235$
Federal individual labor income tax rate for AGI 10	$\tau_{10}^{i,n,f} = 0.1494$
Federal individual capital income tax rate for AGI 10	$\tau_{10}^{i,r,f} = 0.1399$

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Table B-6: State Income Tax Parameters I

State individual labor income tax rate for AGI 1	$\tau_1^{i,n} = 0.0212$
State individual capital income tax rate for AGI 1	$\tau_1^{i,r} = 0.0212$
State individual labor income tax rate for AGI 2	$\tau_2^{i,n} = 0.0454$
State individual capital income tax rate for AGI 2	$\tau_2^{i,r} = 0.0454$
State individual labor income tax rate for AGI 3	$\tau_3^{i,n} = 0.0561$
State individual capital income tax rate for AGI 3	$\tau_3^{i,r} = 0.0561$
State individual labor income tax rate for AGI 4	$\tau_4^{i,n} = 0.0635$
State individual capital income tax rate for AGI 4	$\tau_4^{i,r} = 0.0635$
State individual labor income tax rate for AGI 5	$\tau_5^{i,n} = 0.0695$
State individual capital income tax rate for AGI 5	$\tau_5^{i,r} = 0.0695$
State individual labor income tax rate for AGI 6	$\tau_6^{i,n} = 0.0743$
State individual capital income tax rate for AGI 6	$\tau_6^{i,r} = 0.0743$
State individual labor income tax rate for AGI 7	$\tau_7^{i,n} = 0.0768$
State individual capital income tax rate for AGI 7	$\tau_7^{i,r} = 0.0768$
State individual labor income tax rate for AGI 8	$\tau_8^{i,n} = 0.0797$
State individual capital income tax rate for AGI 8	$\tau_8^{i,r} = 0.0797$
State individual labor income tax rate for AGI 9	$\tau_9^{i,n} = 0.0825$
State individual capital income tax rate for AGI 9	$\tau_9^{i,r} = 0.0825$
State individual labor income tax rate for AGI 10	$\tau_{10}^{i,n} = 0.0846$
State individual capital income tax rate for AGI 10	$\tau_{10}^{i,r} = 0.0846$

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Table B-7: State Income Tax Parameters II

State individual labor income tax exemption rate for AGI 1	$\eta_1^{i,n} = 1.0239$
State individual capital income tax exemption rate for AGI 1	$\eta_1^{i,r} = 1.0256$
State individual labor income tax exemption rate for AGI 2	$\eta_2^{i,n} = 0.7260$
State individual capital income tax exemption rate for AGI 2	$\eta_2^{i,r} = 0.7069$
State individual labor income tax exemption rate for AGI 3	$\eta_3^{i,n} = 0.7041$
State individual capital income tax exemption rate for AGI 3	$\eta_3^{i,r} = 0.6835$
State individual labor income tax exemption rate for AGI 4	$\eta_4^{i,n} = 0.7174$
State individual capital income tax exemption rate for AGI 4	$\eta_4^{i,r} = 0.6976$
State individual labor income tax exemption rate for AGI 5	$\eta_5^{i,n} = 0.7189$
State individual capital income tax exemption rate for AGI 5	$\eta_5^{i,r} = 0.6992$
State individual labor income tax exemption rate for AGI 6	$\eta_6^{i,n} = 0.7130$
State individual capital income tax exemption rate for AGI 6	$\eta_6^{i,r} = 0.6930$
State individual labor income tax exemption rate for AGI 7	$\eta_7^{i,n} = 0.7096$
State individual capital income tax exemption rate for AGI 7	$\eta_7^{i,r} = 0.6893$
State individual labor income tax exemption rate for AGI 8	$\eta_8^{i,n} = 0.7038$
State individual capital income tax exemption rate for AGI 8	$\eta_8^{i,r} = 0.6831$
State individual labor income tax exemption rate for AGI 9	$\eta_9^{i,n} = 0.7166$
State individual capital income tax exemption rate for AGI 9	$\eta_9^{i,r} = 0.6969$
State individual labor income tax exemption rate for AGI 10	$\eta_{10}^{i,n} = 0.7753$
State individual capital income tax exemption rate for AGI 10	$\eta_{10}^{i,r} = 0.7596$

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Table B-8: Other State Tax Parameters

General sales tax rate (effective rate)	$\tau^c = 0.0310$
Excise tax rate (effective rate)	$\tau^{ex} = 0.0132$
Corporate income tax rate (effective rate)	$\tau_1^{corp} = 0.0062$
State tax revenues proportion of GDP	$\frac{TR}{Y} = 0.0504$
Other state tax collections rate	$\tau^o = 0.0055$
Transfers from the federal government	$\frac{FF}{Y} = 0.0347$

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Appendix C: Glossary of Terms

Calibrated – Matching the simulated model to the observable, real-life data by adjusting parameters to ensure the model represents the economy.

Capital adjustment cost – The time and monetary costs of changing the capital a firm uses, such as installing new machinery at a factory.

Capital share – Relative to labor, the proportion of output attributable to capital.

Cobb-Douglas production function – A simple production function in which different combinations of labor and capital quantities are used to obtain a certain quantity of product.

Comparative statics – A method of comparing different economic outcomes before and after a specified change.

Constant elasticity of substitution production function – A production function that assumes the elasticity of substitution is constant, meaning that a change in input factors will result in a constant change in output.

Debt elastic interest rate – An economy-wide interest rate that changes based on the economy's foreign debt holdings.

Depreciation rate – The rate at which capital, such as a car or computer, loses value over time.

Discrete – Measured as separate, distinct points in time, e.g., a person's age in years.

Dynamic scoring – A model that evaluates how changes in policy will change people's economic behavior, or the secondary impacts of a change (e.g., examining the employment and GDP changes that occur as a result of a policy change).

Elasticity – A measure of how the demand of a good responds to a price change for that good.

Employment share – The proportion of the working population employed in each sector of the economy.

Exogenous processes – External factors that influence household decisions.

Lagrangian function – A function that allows you to optimize a variable dependent on constraints, effectively combining a function being optimized with constraint functions.

Markets clear – The result when producers use the price that consumers are willing to pay for a product and there is no shortage or extra product.

Output share – The proportion of the total output of the economy produced by each sector.

Ponzi scheme – An investment fraud in which old investors are paid with money from new investors. Scammers often promise high returns with little or no risk.

Production function – An equation that shows how much product can be made from every combination of input factors, such as capital and labor.

Return on capital – Reveals how well a company is using its capital to make a profit.

Static analysis – A policy analysis that does not consider the economic behavior changes that may occur as a result of a policy change. Primarily, such analysis focuses solely on the changes to tax revenue due to a policy change without factoring in the human response to that change.

Steady-state capital-labor ratio – The ratio of the amount of capital to the amount of labor utilized for production when all markets clear in an economy.

Steady-state equilibrium – The economic choices and prices when market supply and demand are balanced and constant over time.

Stochastic economy – An economy that is affected by random, outside effects.

Tax instruments – The different ways that a government can levy a tax, or different types of taxes (e.g., corporate income tax, sales tax, and property tax).

Utility – The total gratification received from a person consuming a good or service. Economists use utility to capture individual's preferences for differing goods and services. It is assumed that people want to maximize their utility.

ABOUT THE AUTHORS

Rea S. Hederman Jr. is the executive director of the Economic Research Center and vice president of policy at The Buckeye Institute. In this role, Hederman oversees Buckeye's research and policy output. A nationally recognized expert in healthcare policy and tax policy, Hederman has published numerous reports and papers looking at returning health care power to the states, the impact of policy changes on a state's economy, labor markets, and how to reform tax systems to spur economic growth.

Prior to joining Buckeye, Hederman was director, and a founding member of the Center for Data Analysis (CDA) at the Heritage Foundation, where he served as the organization's top "number cruncher." Under Hederman's leadership, the CDA provided state-of-the-art economic modeling, database products, and original studies.

While at Heritage, Hederman oversaw technical research on taxes, health care, income and poverty, entitlements, energy, education, and employment, among other policy and economic issues, and he was responsible for managing the foundation's legislative statistical analysis and econometric modeling.

In 2014, Hederman was admitted into the prestigious Cosmos Club as a recognition of his scholarship. He graduated from Georgetown Public Policy Institute with a Master of Public Policy degree and holds a Bachelor of Arts degree in history and foreign affairs from the University of Virginia.

Andrew J. Kidd, Ph.D. is an economist with the Economic Research Center at The Buckeye Institute. In this position, Kidd conducts and produces original economic research that looks at and analyzes the impact of state and federal policies on peoples' lives and on the economy.

Prior to joining The Buckeye Institute, Kidd worked in litigation consulting, providing expert testimony related to economic damages in legal cases. Kidd also served as a research assistant at the UW Population Health Institute at the University of Wisconsin-Madison, which, through its health policy group, performs research and analysis projects on health care access, cost, financing, health system performance, and quality. During his time at the University of Wisconsin-Madison, Kidd's research focus was in demography, education, labor outcomes, and the effects of public policy on labor, education, and health outcomes. He was a College of Letters and Science teaching fellow and was awarded the Anna Morris Ely Teaching Award from the Department of Economics. While there, he taught classes in wages and the labor market, analytical public finance, the principles of microeconomics, and the principles of macroeconomics.

Kidd continues to study questions regarding labor markets and the effects of public policy and demographics on labor market outcomes and behaviors, as well as evaluating health care policy and education policy. A native of Lima, Ohio, Kidd received his bachelor's degree in economics and mathematics from the University of Notre Dame before completing his master's degree and his doctorate in economics from the University of Wisconsin-Madison.

James B. Woodward, Ph.D. is an economic research analyst with the Economic Research Center at The Buckeye Institute. In this position he collects economic data, performs research, and writes about economic policy issues.

Prior to joining The Buckeye Institute, Woodward earned his Master of Public Policy and a Ph.D. in public policy from the University of Kentucky. During his time there, Woodward worked for the commonwealth's Hazard Mitigation Grant program, helping to verify the quality of regional emergency preparedness plans. He also performed policy-related research for the Commonwealth Council on Developmental Disabilities, contributing to a paper on possible, new treatment options for those with disabilities.

Woodward has also spent time researching public economics, health economics, and occupational licensing. His dissertation, *American Obesity: Rooted in Uncertainty, Institutions, and Public Policy*, looked at the role bad public policy (as opposed to consumers and/or market forces) may have played in the rapid increase in obesity rates.

A native of Athens, Ohio, Woodward received his bachelor's degree in economics from Ohio University before going on to complete his graduate studies.

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