Continuing Kentucky Tax Reform Efforts

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Executive Summary

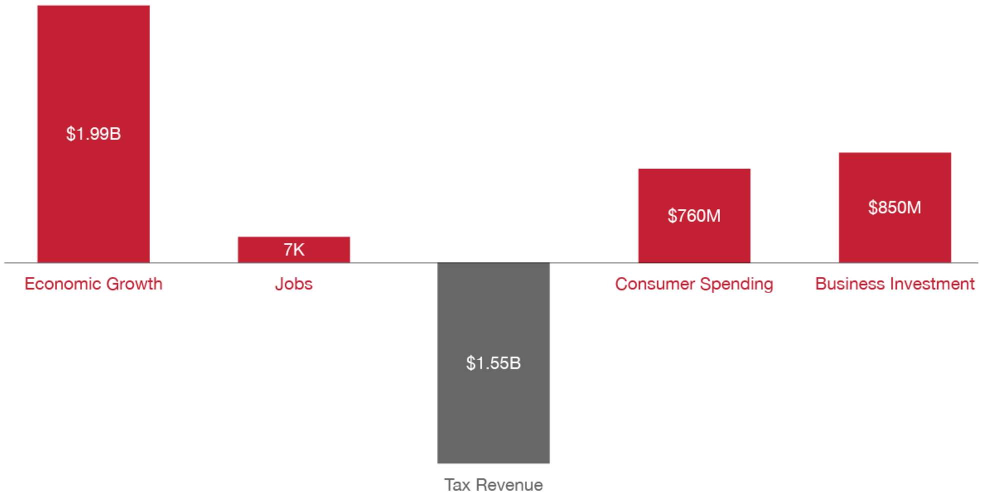
Kentucky has established itself as a national leader in pro-growth tax reform after landmark legislation in 2018 replaced a complex graduated income tax with a flat rate and broadened the sales tax base. These structural improvements have propelled the Commonwealth's business tax climate ranking from 37th to 18th and built a historic Budget Reserve Trust Fund. To sustain this competitive momentum and address unprecedented workforce mobility, The Buckeye Institute used its dynamic scoring model—STELA—to model the economic effects of the next two phases of tax reform: a scheduled reduction to a 3.5 percent individual income tax rate in 2026, and a hypothetical reduction to three percent in 2027.

The dynamic analysis confirms that reducing taxes on labor triggers immediate economic growth. As the tax burden falls, the economy experiences a sharp acceleration in capital mobilization and labor supply. This activity generates a powerful feedback loop in which new economic growth creates new state revenue, significantly offsetting the static costs of the rate cuts. STELA forecasts that Kentucky's growth domestic product (GDP) will grow by $510 million and private investment will surge by $260 million as capital is deployed early, reducing the static revenue loss of $718 million to a dynamic loss of just $410 million.

A subsequent reduction to three percent in 2027 amplifies these gains with increased business investment. Once fully implemented, the deeper tax cut raises GDP by $810 million and private investment by $370 million, containing the dynamic revenue loss to $640 million.

By 2034, fully phasing in the three percent flat tax will permanently elevate Kentucky's economic baseline. STELA forecasts that annual GDP will rise by $1.99 billion, supported by $850 million in new annual investment and 7,000 new jobs. This analysis confirms that eliminating Kentucky's personal income tax remains a fiscally responsible path to sustained growth, allowing the commonwealth to compete effectively for talent and investment in an increasingly mobile economy.

Scenario Two: Cutting the Personal Income Tax to 3% (by 2034)



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Introduction

States across the country have recently pursued pro-growth tax reforms designed to flatten or eliminate their income taxes—and for good reason. Income taxes discourage work and investment and hinder productivity. Economic research routinely confirms that only corporate taxes are more damaging to growth and prosperity than personal income taxes.[1] By taxing personal income, states inevitably influence incentives for earning that income: the less income that earners may keep, the less incentive they have to earn it. Internationally, a 10 percent reduction in the marginal income tax rate increased the employment rate in the average Organisation for Economic Co-operation and Development (OECD) country by 3.7 percentage points,[2] while domestically, state taxes here reduce personal income over the long-term as negative economic incentives accumulate.[3]

Acknowledging that economic reality, Kentucky made a bold, necessary policy move with landmark legislation in 2018 that converted its complex graduated income tax into a single, flat-rate tax of five percent and strategically broadened the sales tax base to fund the initial rate reduction responsibly.[4] Subsequently, House Bill 8 in 2022 began continuous rate reductions designed to phase out the individual income tax entirely.[5] These structural changes have proven dramatically successful, fueling consecutive record-breaking budget surpluses and propelling Kentucky's national tax ranking from 37th in 2018[6] to a more competitive 18th by 2024.[7]

A measure of this success, Kentucky's General Fund revenue rose 2.8 percent to $15.57 billion in fiscal year 2024, as the state's personal income tax, sales tax, and use tax each contributed approximately 37.3 percent to the total fund. Individual income tax collections settled at $5.81 billion, a slight 0.6 percent decline driven

[1] ***Tax and Economic Growth***, Organisation for Economic Co-operation and Development, July 11, 2008.
[2] Andrea Bassanini and Romain Duval, **Employment Patterns in OECD Countries: Reassessing the Role of Policies and Institutions**, working papers 35, OECD Social, Employment and Migration, June 9, 2006.
[3] W. Robert Reed, **The Robust Relationship between Taxes and U.S. State Income Growth**, *National Tax Journal*, Volume 61, Issue 1 (March 2008) p. 57-80.
[4] **House Bill 366**, 2018 Regular Session General Assembly (Ky. 2018).
[5] **House Bill 8**, 2022 Regular Session General Assembly (Ky. 2022).
[6] Jared Walczak, Scott Drenkard, and Joseph Bishop-Henchman, **2018 State Business Tax Climate Index**, Tax Foundation, October 17, 2017.
[7] Jared Walczak, Andrey Yushkov, and Katherine Loughead, **2024 State Business Tax Climate Index**, Tax Foundation, October 24, 2023.

by the reduction in the statutory tax rate, while sales and use tax receipts rose to $5.80 billion on the strength of 4.1 percent growth in consumer spending. Business taxes also performed well, with corporate income and limited liability entity tax revenue climbing 2.3 percent to $1.25 billion (eight percent of the total). These totals, along with other smaller tax receipts, have raised Kentucky's Budget Reserve Trust Fund to $3.76 billion,[8] and reached the revenue triggers needed for the next phase of reform.[9] Accordingly, the Kentucky legislature passed House Bill 1 (2025),[10] which will reduce the income tax rate from four to 3.5 percent in 2026 as a pure tax cut paid for by the commonwealth's own economic success.

And Kentucky's success looks poised to continue. Using its dynamic analytical tool, The Buckeye Institute has modeled the economic impact of two pro-growth tax reform scenarios: (1) Kentucky's scheduled personal income tax rate reduction from four to 3.5 percent in 2026, and (2) an additional hypothetical, trigger-based reduction from 3.5 to three percent in 2027. Both scenarios will unleash significant economic growth, boost private-sector investment, increase personal consumption, and create new jobs across the commonwealth.

Competitive Tax Policy Matters

Having a competitive state tax code matters when trying to retain residents and attract new businesses and workers. States with above-average income tax rates tend to lose population to other states compared to those with lower tax rates,[11] and high progressive income taxes are more likely to drive investment and relocation decisions of successful businesses and workers.[12] Higher taxes on high incomes raise less revenue than anticipated, as more affected taxpayers leave the state and reduce the overall tax base.[13] Such emigration shrinks present and future tax revenues and economic growth, compounding the harm. With high-skilled workers and businesses more mobile now than ever, Internal Revenue Service data confirms significant transfers of taxpayers and income from high-tax to low-tax

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[8] **State Ends Fiscal Year with $131 Million Surplus**, Kentucky League of Cities, August 22, 2025.
[9] **A Guide to House Bill 8 and Reducing Income Taxes for Kentucky Policymakers and Stakeholder**, Kentucky Chamber Center for Policy & Research, 2022.
[10] **House Bill 1**, 2025 Regular Session General Assembly (Ky. 2025).
[11] Katherine Loughead, **Americans Moved to Low-Tax States in 2024**, The Tax Foundation, January 7, 2025.
[12] Jonathan Gruber and Emmanuel Saez, "**The elasticity of Taxable Income: evidence and implications**," *Journal of Public Economics*, Volume 84 (2002) p. 1-32.
[13] Joshua Rauh and Ryan Shyu, **Behavior Responses to State Income Taxation of High Earners: Evidence From California**, *American Economic Journal: Economic Policy*, Volume 16 Issue 1 (February 2024) p. 34-86.

states.[14] Fortunately, Kentucky's flat-tax move has already proven advantageous, yielding net population gains in the fight for new residents.[15]

But that fight is far from over. The Tax Foundation's 2026 State Tax Competitiveness Index shows that as other states accelerate their own reforms, Kentucky's now ranks 25th overall.[16] The commonwealth faces critical economic competition from its neighbors, most notably zero-tax Tennessee (ranked 8th) and low-tax Indiana (ranked 10th). And earlier in 2025, Ohio adopted a flat tax with a top tax rate of 2.75 percent, one of the lowest in the country. To meet the competitive challenge, Kentucky will need further responsible tax reform and prudent fiscal management. The commonwealth's historic surpluses are not merely a defense against economic downturns but offer strategic assets that provide the state with the economic flexibility to invest in pro-growth reforms that will keep more money in the private sector and make Kentucky's economy more dynamic and competitive.

As Kentucky policymakers consider and pursue viable reforms, they should remember that tax codes should be simple, transparent, neutral, and stable.[17] A simple tax code means that businesses and individuals can spend less time and money on compliance costs, and taxpayers make fewer honest mistakes in their tax filings. A transparent tax code means fewer tax gimmicks, credits, and deductions that reward crony capitalism and special-interest lobbying. A neutral tax code means taxpayers pay the same rate for the same economic activity and their savings are not penalized with multiple investment taxes. And a stable tax code reduces uncertainty, allowing businesses and workers to plan effectively. Kentucky's plan to continue reducing its flat tax rate to zero aligns with these goals and maintains a low rate across a broad base.

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[14] Andrey Yushkov, **Taxes and Interstate Migration: 2024 Update**, Tax Foundation, September 3, 2024.
[15] Katherine Loughead, **Americans Moved to Low-Tax States in 2024**, The Tax Foundation, January 7, 2025.
[16] Janelle Fritts, Jared Walczak, Abir Mandal, and Katherine Loughead, **2026 State Tax Competitiveness Index**, Tax Foundation, October 30, 2025.
[17] Rea S. Hederman Jr., Tom Lampman, Greg R. Lawson, and Joe Nichols, ***Tax Reform Principles for Ohio***, The Buckeye Institute, February 2, 2015.

Modeling the Economic Impact of Tax Cuts

Scenario 1: Cutting the Personal Income Tax to 3.5%

Scenario 1 models the personal income tax cut from four to 3.5 percent, which took effect on January 1, 2026. The results demonstrate a distinct unlocking effect immediately upon implementation. As the tax burden is reduced, the economy experiences a sharp initial surge in capital mobilization, with investment jumping by $260 million and GDP rising by $510 million in 2026 alone (See Table I). This immediate release of economic activity generates significant dynamic feedback.

Following this initial acceleration, the economy grows at a permanently higher level due to the structural improvement in the tax code. By 2034, the sustained incentives are expected to lift annual GDP by $1.76 billion, boost investment by $750 million, and increase consumer spending by $670 million. While the static revenue cost grows over time, this long-term expansion provides a durable offset, supporting the creation of 6,000 new jobs by 2034.

Table I | Scenario One: Cutting the Personal Income Tax to 3.5%[18]

Year	GDP	Employment	Tax Revenue	Consumption	Investment
2026 Baseline	$295.4B	2.04M	$15.7B	$224.4B	$67.1B
2026 Change	$510M	2K	-$410M	$180M	$260M
2027 Baseline	$304.2B	2.10M	$16.2B	$231.1B	$69.1B
2027 Change	$720M	3K	-$560M	$260M	$330M
2028 Baseline	$313.4B	2.16M	$16.7B	$238B	$71.1B
2028 Change	$920M	3K	-$720M	$330M	$400M

[18] The Buckeye Institute's STELA model. Dollar figures are in 2024 dollars, employment is full-time equivalent non-farm jobs.

2029 Baseline	$322.8B	2.22M	$17.2B	$245.2B	$73.3B
2029 Change	$1.14B	4K	-$890M	$410M	$490M
2030 Baseline	$332.4B	2.29M	$17.7B	$253.5B	$75.5B
2030 Change	$1.37B	5K	-$1.06B	$500M	$590M
2031 Baseline	$342.4B	2.36M	$18.2	$260.1B	$77.8B
2031 Change	$1.61B	6K	-$1.24B	$600M	$690M
2032 Baseline	$352.7B	2.43M	$18.8B	$267.9B	$80.1B
2032 Change	$1.66B	6K	-$1.28B	$620M	$710M
2033 Baseline	$363.2B	2.50M	$19.3B	$276.0B	$82.5B
2033 Change	$1.71B	6K	-$1.32B	$640M	$730M
2034 Baseline	$374.2B	2.58M	$19.9B	$284.2B	$85.1B
2034 Change	$1.76B	6K	-$1.36B	$670M	$750M

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Scenario 2: Cutting the Personal Income Tax to 3.0%

Scenario 2 models the next potential step in Kentucky's pro-growth reform: a hypothetical reduction of the personal income tax rate from 3.5 percent to three percent. This scenario assumes the state meets its fiscal triggers again, immediately following the 2026 implementation, which would authorize the rate to fall to three percent in 2027. Upon implementation in 2027, the economy responds immediately, with GDP rising by $810 million and private investment increasing by $370 million in the first year alone (See Table II).

STELA forecasts that once this policy is fully phased in (by 2034), it will generate $1.99 billion in new annual GDP, while spurring $760 million in new consumption and $850 million in new private investment. This economic expansion is driven by the creation of 7,000 new jobs. This dynamic growth provides a substantial feedback effect that offsets the static tax reduction.

Table II | Scenario Two: Cutting the Personal Income Tax to 3%[19]

Year	GDP	Employment	Tax Revenue	Consumption	Investment
2026 Baseline	$295.4B	2.04M	$15.7B	$224.4B	$67.1B
2026 Change	$510M	2K	-$410M	$180M	$260M
2027 Baseline	$304.2B	2.10M	$16.2B	$231.1B	$69.1B
2027 Change	$810M	3K	-$640M	$290M	$370M
2028 Baseline	$313.4B	2.16M	$16.7B	$238B	$71.1B
2028 Change	$1.05B	4K	-$820M	$380M	$460M
2029 Baseline	$322.8B	2.22M	$17.2B	$245.2B	$73.3B
2029 Change	$1.30B	5K	-$1.01B	$470M	$560M
2030 Baseline	$332.4B	2.29M	$17.7B	$252.2B	$75.5B
2030 Change	$1.56B	6K	-$1.21B	$580M	$670M
2031 Baseline	$342.4B	2.36M	$18.2B	$260.1B	$77.7B

[19] The Buckeye Institute's STELA model. Dollar figures are in 2024 dollars, employment is full-time equivalent non-farm jobs.

2031 Change	$1.83B	7K	-$1.42B	$680M	$780M
2032 Baseline	$352.7B	2.43M	$18.8B	$267.9B	$80.1B
2032 Change	$1.88B	7K	-$1.46B	$710M	$810M
2033 Baseline	$363.2B	2.50M	$19.3B	$276.0B	$82.5B
2033 Change	$1.94B	7K	-$1.50B	$740M	$830M
2034 Baseline	$374.2B	2.58M	$19.9B	$284.2B	$85.1 B
2034 Change	$1.99B	7K	-$1.55B	$760M	$850M

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Conclusion

Kentucky must continue its pro-growth tax reforms to compete economically with its low-tax neighbors. Historic fiscal health, driven by prudent management and a record-breaking Rainy Day Fund, allows legislative flexibility for responsible reforms and tax refunds. Facing unprecedented workforce mobility, Kentucky cannot afford to maintain a personal income tax that penalizes work and investment. The commonwealth's move to a flat-tax was a critical first step, and the legislated path to eliminating the personal income tax altogether will be crucial for attracting and retaining the talent and businesses Kentucky needs.

The modeled scenarios confirm that reducing taxes on labor yields more work and more investment, which creates a powerful dynamic feedback effect that generates new state revenue to significantly reduce the net cost of the tax cut. This analysis gives policymakers a better understanding of the tax policy's full impact and confirms that eliminating Kentucky's personal income tax remains a fiscally responsible path to sustained economic growth and a more competitive future.

Appendix

Appendix A: STELA's Methodology

Economists at The Buckeye Institute developed and maintain a dynamic scoring model—STELA (state tax and economic long-run analysis 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, STELA predicts how individuals, households, and businesses will alter their economic choices in response to changes in the private economy and public policy over time.

STELA is calibrated for the state being modeled using publicly available state and federal data and relies 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 (GDP), job creation or loss, and government revenue.

STELA has undergone a double-blind peer review and incorporated comments from those reviews consistent with current academic standards and methodologies. STELA's full technical description provided below will allow researchers to validate the model's accuracy and the conclusions that The Buckeye Institute draws in its research.

STELA's Framework

STELA 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. STELA's 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, STELA includes a condition in which state governments satisfy a budget constraint where debt cannot increase beyond a certain level. STELA 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, Buckeye then explicitly defines 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 $e = \{1, \ldots, E\}$. 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 $\sum_{s=1}^{S} \mu_s = 1$. Buckeye 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:

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

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

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

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

$V_{e,t}(s)$ 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), Buckeye assumes 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:

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

Buckeye assumes 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.

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

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

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

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

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:

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

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), Buckeye writes 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 STELA. 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 STELA. 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, Buckeye denotes 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 Buckeye denotes $\omega_e(s)$

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

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

Buckeye's data for calibrating STELA come from publicly available federal and state data sources. First, Buckeye presents its sources for STELA's output variables. Then Buckeye presents the sources for STELA's parameters and Buckeye's empirical methodology for calibrating STELA.

Output Variables

Primarily, Buckeye utilizes BEA Regional Economic Accounts for the state being modeling for its output. All GDP variables are reported in real (2023 dollars) per capita terms using the U.S. GDP deflator reported by the BEA and, if not declared otherwise, Buckeye refers to the period of 1997-2022.

Buckeye's GDP projections use the latest GDP values and apply the state's GDP long-run annual growth rate from 1997-2022.

For Buckeye's measures of consumption, consumption expenditures on durable goods are subtracted from total personal consumption expenditures (PCE). Buckeye considers durable goods as investment goods, as is standard in the macroeconomics literature.

Because the BEA does not report private fixed investment at the state level, Buckeye uses 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 Buckeye's measures of investment. STELA's methodology excludes residential investment from its measure of investment (residential investment is excluded from GDP as well).

Buckeye bases its employment data for the number of non-farm jobs on data from the Bureau of Labor Statistics. Buckeye calculates the employment shares per sector using data from the BEA Regional Economic Accounts. Buckeye takes 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 STELA's calibration. For the baseline projections, employment is assumed to grow at its annual growth rate for 1997-2022.

Buckeye uses 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, Buckeye uses employment multiplied by the average hours worked per year. 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).

STELA's Parameters and Calibration

Typically, a calibration assigns values to STELA's parameters by matching first and second moments of the data that the model aims to explain. Buckeye utilizes moments in state and federal data to estimate the model parameters.

Because depreciation data are not reported at the state level by the BEA, Buckeye refers 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 1997-2022. The average over this period represents the depreciation rate in STELA.

The world interest rate is taken as $i_{r,w} = 0.043$.

To compute the sector-specific labor shares, Buckeye uses data from the BEA Regional Income Division. Similar to Gomme and Rupert (2004), Buckeye divides the compensation of employees by the personal income for each sector. As personal income is not available for sectors, Buckeye constructs 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 1997-2023. The sector specific parameter θ_s is set to match the observed average labor shares for each of the $S = 9$ production sectors.[20] 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.[21]

[20] See complete list of sectors in STELA's Parameters section.

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

The earning ability for household types is based on the distribution of income and population. 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. Buckeye takes its Frisch elasticity estimate $\psi_e = 0.4$ from Reichling and Whalen (2012). The parameter D is set to match the observed average trade-balance to output ratio since $TB = i_{r,w} \frac{D}{y}$. Buckeye estimates tax rates similar to the methodology used by McDaniel (2007).[22]

[22] A complete explanation of the methodology is included in STELA's Parameters section.

Appendix B: STELA's Parameters

Tax Rate Estimates

The state tax rates calculated in this paper are average Kentucky 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, The Buckeye Institute divided each category of tax revenue by the corresponding income or expenditure. Since The Buckeye Institute computes tax rates in the same fashion each year, time subscripts were dropped 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 U.S. Internal Revenue Service for tax year 2020.[23] 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 The Buckeye Institute takes 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, The Buckeye Institute calculates 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. (1994), assume that the tax rate on household labor income is the same as the tax

[23] **2024 State Government Tax Tables**, U.S. Department of Commerce, U.S. Census Bureau (Last visited November 7, 2025); **SOI Tax Stats – Historic Table 2**, IRS.gov (Last visited November 7, 2025).

rate on household capital income.[24] The Buckeye Institute makes 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:

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

[24] 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.

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 by the U.S. Internal Revenue Service for tax year 2020.[25] 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:

$$\tau^i = \frac{SHHT_e}{\big(GDP - (TPI - Sub)\big)_i}$$

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

[25] **SOI Tax Stats – Historic Table 2**, IRS.gov (Last visited November 7, 2025).

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 Kentucky.

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 by the U.S. Internal Revenue Service for tax year 2020.[26]

The state household capital income tax rate is then:

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

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

[26] **SOI Tax Stats – Historic Table 2**, IRS.gov (Last visited November 7, 2025).

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

Parameters

The following tables present the calibrated parameters for the model.

Table B-2: Household Parameters*	
Disutility of Labor	$\chi_e = 42.0$
Real Interest Rate	$i_{r,w} = 0.043$
Annual Depreciation Rate of Capital	$\delta = 0.1$
Frisch Elasticity of Labor Supply	$\psi_e = 0.4$
Holding Cost of Capital	$\nu = -0.0395$

The real interest rate is partially 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
$z_1 = 1$	$q^1 = 0.145$
$z_2 = 3.81$	$q^2 = 0.154$
$z_3 = 12.15$	$q^3 = 0.244$
$z_4 = 19.78$	$q^4 = 0.129$
$z_5 = 28.92$	$q^5 = 0.109$
$z_6 = 40.83$	$q^6 = 0.105$
$z_7 = 57.17$	$q^7 = 0.043$
$z_8 = 82.77$	$q^8 = 0.051$
$z_9 = 109.08$	$q^9 = 0.009$
$z_{10} = 365.48$	$q^{10} = 0.009$

Table B-4: Sector Specific Parameters

Sector	Output Share	Employment Share	Capital Share
Agriculture, Forestry, Fishing, and Hunting	$\alpha_1 = 0.017$	$\mu_1 = 0.045$	$\theta_1 = 0.741$
Mining	$\alpha_2 = 0.012$	$\mu_2 = 0.009$	$\theta_2 = 0.298$
Utilities, Transportation, and Warehousing	$\alpha_3 = 0.080$	$\mu_3 = 0.065$	$\theta_3 = 0.393$
Construction	$\alpha_4 = 0.045$	$\mu_4 = 0.060$	$\theta_4 = 0.525$
Manufacturing	$\alpha_5 = 0.196$	$\mu_5 = 0.117$	$\theta_5 = 0.347$
Trade	$\alpha_6 = 0.158$	$\mu_6 = 0.156$	$\theta_6 = 0.365$
Services	$\alpha_7 = 0.265$	$\mu_7 = 0.380$	$\theta_7 = 0.413$
Real Estate, Rental, and Leasing	$\alpha_8 = 0.125$	$\mu_8 = 0.043$	$\theta_8 = 0.714$
Health Care and Social Assistance	$\alpha_9 = 0.102$	$\mu_9 = 0.126$	$\theta_9 = 0.379$

Table B-5: Federal Tax Parameters	
Federal individual labor income tax rate for AGI 1	$\tau_1^{i,n,f} = 0.0000$
Federal individual capital income tax rate for AGI 1	$\tau_1^{i,r,f} = 0.0000$
Federal individual labor income tax rate for AGI 2	$\tau_2^{i,n,f} = 0.4624$
Federal individual capital income tax rate for AGI 2	$\tau_2^{i,r,f} = 0.4624$
Federal individual labor income tax rate for AGI 3	$\tau_3^{i,n,f} = 0.4004$
Federal individual capital income tax rate for AGI 3	$\tau_3^{i,r,f} = 0.4004$
Federal individual labor income tax rate for AGI 4	$\tau_4^{i,n,f} = 0.3585$
Federal individual capital income tax rate for AGI 4	$\tau_4^{i,r,f} = 0.3585$
Federal individual labor income tax rate for AGI 5	$\tau_5^{i,n,f} = 0.4243$
Federal individual capital income tax rate for AGI 5	$\tau_5^{i,r,f} = 0.4243$
Federal individual labor income tax rate for AGI 6	$\tau_6^{i,n,f} = 0.3886$
Federal individual capital income tax rate for AGI 6	$\tau_6^{i,r,f} = 0.3886$
Federal individual labor income tax rate for AGI 7	$\tau_7^{i,n,f} = 0.3886$
Federal individual capital income tax rate for AGI 7	$\tau_7^{i,r,f} = 0.3886$
Federal individual labor income tax rate for AGI 8	$\tau_8^{i,n,f} = 0.3328$
Federal individual capital income tax rate for AGI 8	$\tau_8^{i,r,f} = 0.3328$
Federal individual labor income tax rate for AGI 9	$\tau_9^{i,n,f} = 0.2734$
Federal individual capital income tax rate for AGI 9	$\tau_9^{i,r,f} = 0.2734$
Federal individual labor income tax rate for AGI 10	$\tau_{10}^{i,n,f} = 0.2896$
Federal individual capital income tax rate for AGI 10	$\tau_{10}^{i,r,f} = 0.2896$

Table B-6: State Income Tax Parameters I	
State individual labor income tax rate for AGI 1	$\tau_1^{i,n} = 0.04$
State individual capital income tax rate for AGI 1	$\tau_1^{i,r} = 0.04$
State individual labor income tax rate for AGI 2	$\tau_2^{i,n} = 0.04$
State individual capital income tax rate for AGI 2	$\tau_2^{i,r} = 0.04$
State individual labor income tax rate for AGI 3	$\tau_3^{i,n} = 0.04$
State individual capital income tax rate for AGI 3	$\tau_3^{i,r} = 0.04$
State individual labor income tax rate for AGI 4	$\tau_4^{i,n} = 0.04$
State individual capital income tax rate for AGI 4	$\tau_4^{i,r} = 0.04$
State individual labor income tax rate for AGI 5	$\tau_5^{i,n} = 0.04$
State individual capital income tax rate for AGI 5	$\tau_5^{i,r} = 0.04$
State individual labor income tax rate for AGI 6	$\tau_6^{i,n} = 0.04$
State individual capital income tax rate for AGI 6	$\tau_6^{i,r} = 0.04$
State individual labor income tax rate for AGI 7	$\tau_7^{i,n} = 0.04$
State individual capital income tax rate for AGI 7	$\tau_7^{i,r} = 0.04$
State individual labor income tax rate for AGI 8	$\tau_8^{i,n} = 0.04$
State individual capital income tax rate for AGI 8	$\tau_8^{i,r} = 0.04$
State individual labor income tax rate for AGI 9	$\tau_9^{i,n} = 0.04$
State individual capital income tax rate for AGI 9	$\tau_9^{i,r} = 0.04$
State individual labor income tax rate for AGI 10	$\tau_{10}^{i,n} = 0.04$
State individual capital income tax rate for AGI 10	$\tau_{10}^{i,r} = 0.04$

Table B-7: State Income Tax Parameters II	
State individual labor income tax exemption rate for AGI 1	$\eta_1^{i,n} = 0.1152$
State individual capital income tax exemption rate for AGI 1	$\eta_1^{i,r} = 0.1152$
State individual labor income tax exemption rate for AGI 2	$\eta_2^{i,n} = 0.2733$
State individual capital income tax exemption rate for AGI 2	$\eta_2^{i,r} = 0.2733$
State individual labor income tax exemption rate for AGI 3	$\eta_3^{i,n} = 0.0908$
State individual capital income tax exemption rate for AGI 3	$\eta_3^{i,r} = 0.0908$
State individual labor income tax exemption rate for AGI 4	$\eta_4^{i,n} = 0.0558$
State individual capital income tax exemption rate for AGI 4	$\eta_4^{i,r} = 0.0558$
State individual labor income tax exemption rate for AGI 5	$\eta_5^{i,n} = 0.0388$
State individual capital income tax exemption rate for AGI 5	$\eta_5^{i,r} = 0.0388$
State individual labor income tax exemption rate for AGI 6	$\eta_6^{i,n} = 0.0278$
State individual capital income tax exemption rate for AGI 6	$\eta_6^{i,r} = 0.0278$
State individual labor income tax exemption rate for AGI 7	$\eta_7^{i,n} = 0.0200$
State individual capital income tax exemption rate for AGI 7	$\eta_7^{i,r} = 0.0200$
State individual labor income tax exemption rate for AGI 8	$\eta_8^{i,n} = 0.0142$
State individual capital income tax exemption rate for AGI 8	$\eta_8^{i,r} = 0.0142$
State individual labor income tax exemption rate for AGI 9	$\eta_9^{i,n} = 0.0106$
State individual capital income tax exemption rate for AGI 9	$\eta_9^{i,r} = 0.0106$
State individual labor income tax exemption rate for AGI 10	$\eta_{10}^{i,n} = 0.0032$
State individual capital income tax exemption rate for AGI 10	$\eta_{10}^{i,r} = 0.0032$

Table B-8: Other State Tax Parameters	
General sales tax rate (effective rate)	$\tau^c = 0.0289$
Excise tax rate (effective rate)	$\tau^{ex} = 0.0139$
Corporate income tax rate (effective rate)	$\tau_1^{corp} = 0.0219$
State tax revenues proportion of GDP	$\frac{TR}{Y} = 0.0658$
Other state tax collections rate	$\tau^o = 0.0785$
Transfers from the federal government	$\frac{FF}{Y} = 0.0792$

Appendix B: 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 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 healthcare 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 also oversaw the organization's technical research on taxes, healthcare, income and poverty, entitlements, energy, education, and employment, among other policy and economic issues. He was also responsible for managing Heritage's legislative statistical analysis and econometric modeling.

Hederman's commentary has been published in *The Washington Post*, *The Washington Times*, *National Affairs*, *The Hill*, National Review Online, and FoxNews.com, among others. He is regularly quoted by major newspapers and wire services, and has appeared on Fox News Channel, CNN, CNBC, and MSNBC.

Hederman graduated from **Georgetown Public Policy Institute** with a Master of Public Policy degree and holds a Bachelor of Arts from the **University of Virginia**.

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Before joining The Buckeye Institute, Sai worked as a graduate research assistant at the **University of Arizona**, where he contributed to projects examining the effects of fiscal policy, energy efficiency programs, and income distribution. He also completed a capstone project with American Express, where he analyzed consumer behavior and financial risk as part of a broader effort to improve decision-making in credit and collections.

Sai holds a master's degree in applied econometrics and data analytics from the **University of Arizona**, where his academic work focused on labor economics, fiscal policy, tax modeling, and applied econometric techniques. His thesis explored the relationship between government size and its effects on economic growth, income distribution, and social development across countries. His training included building and interpreting dynamic econometric models with a focus on time-series and panel data analysis to evaluate long-term policy impacts.

Sai's research interests include labor market dynamics, tax reform and estimation, public finance, energy economics, and the long-term effects of fiscal and regulatory policy on economic development and income distribution. He also explores public policy literature and economic history and is passionate about using applied research to develop real-world solutions that support sustainable economic growth.