PELICAN INSTITUTE FOR PUBLIC POLICY

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Addressing Louisiana's Budget Shortfall: Strategies for Growth

By

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Forward by Stephen M. Gelé

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Dear Reader,

As Chairman of the Board of Directors at the Pelican Institute, Louisiana's premier voice for free markets, I am pleased to unveil *Addressing Louisiana's Budget Shortfall: Strategies for Growth*, a detailed study produced in partnership with The Buckeye Institute's Economic Research Center. Working with Buckeye's Economic Research Center, we have provided timely, data-driven research to Louisiana policymakers so they can see on how various policy proposals affect economic activity and tax revenues, and make educated decisions on proposals before the legislature.

Using a more reliable dynamic scoring model, this groundbreaking report looks at and tests 12 different proposed policy changes lawmakers are considering and how those proposed changes to Louisiana's tax policy would affect gross domestic product, jobs creation or loss, and revenue. The report found that Louisiana's proposal to raise taxes to finance more government spending will hinder economic activity and growth.

This report is critical in providing the legislature with sound research on the impact of changes to tax policy, but it is only half of the issue. To fully address the state's economic problems, we must look at and address the level of government spending. Only by reforming both the revenue side, through the adoption of pro-growth tax policies, and by getting our government spending under control, will Louisiana begin to spur economic growth at the rate we need to succeed and grow.

I would like to thank the leadership of both the Pelican Institute and The Buckeye Institute's Economic Research Center, and the authors of the report for their hard work in conducting this research and preparing this report. I am confident that if Louisiana follows the recommendations included herein and begins to control its spending the economic future for the Pelican State will be bright.

Stephen M. Gelé
Chairman of the Board of Directors
Pelican Institute

Executive Summary

Hurricanes Katrina and Rita were devastating for Louisiana and her economy. Prior to those storms, Louisiana's gross domestic product (GDP) had enjoyed 2.5% long-run average annual growth in the post-war period. Since then, however, the state's GDP growth rate has been an anemic -0.9%. Alleviating some of Louisiana's immediate financial needs following the hurricanes, the Pelican State received significant disaster relief funding, with federal aid more than doubling from $6.3 billion in 2005-2006 to 12.8 billion in 2007-2008, and the state's tax collections benefited from peak oil and natural gas prices in 2008. But the Great Recession that began in 2008 crippled Louisiana's already sluggish economy, causing persistent annual budget deficits as tax revenues routinely fall short of state spending.

In the aftermath of the Gulf Coast storms, with federal aid and disaster relief funds filling state coffers, Louisiana began raising state salaries and out-spending her revenues—spending increases that have compounded the state's fiscal troubles. As federal aid dried-up and oil prices plummeted, Louisiana again faced economic hardships, slow growth, deficits, and unbalanced state budgets.

Louisiana policymakers continue to explore remedies for state shortfalls, and The Buckeye Institute has developed a dynamic macroeconomic model that simulates how various policy scenarios might affect economic activity and tax revenues. Applying our calibrated model reveals, for example, that tax structures that penalize investment are more harmful to productive economic activity than sales taxes that penalize consumption. Taxes that lower returns on investments—including taxes on labor and capital—tend to have lasting adverse effects on capital available for the productive sectors of the economy, thereby weakening the economy more severely than consumption taxes. Our model's simulations also demonstrate that despite generating additional tax revenues, raising tax rates to finance more government spending will ultimately hinder economic activity and growth.

To help state policymakers better understand the likely benefits and consequences of proposed fiscal reforms, this paper briefly surveys Louisiana's economy and recent challenges, and then summarizes our model's projections as applied to a broad range of current tax and spending proposals.

Overview of Louisiana's Economy

Since Hurricane Katrina and Hurricane Rita devastated regions of Louisiana and the Gulf Coast in 2005, the Pelican State has struggled to regain its economic footing. Before the hurricanes, Louisiana had enjoyed a steadily growing economy, but the well-intentioned disaster relief efforts after the storms inflicted economic harms not readily apparent at the time. The negative effects of those efforts linger even today.

After the hurricanes, federal aid and disaster relief funds poured into the state, giving Louisiana's gross domestic product (GDP) a short-term boost. Unfortunately, the large influx of federal aid led to an all too predictable decline in private investment. (See, Berg, Mirzoev, Portillo, & Zanna (2012) showing the negative impact of government aid on private investment.) In 2006, the growth rate of the state's real GDP began to decline sharply, leaving Louisiana's economy in worse condition than it had been prior to Hurricane Katrina (consistent with Herzer and Morrissey's (2009) finding that government aid negatively affects domestic output by reducing private investment and distorting incentives).

Even as the state's real GDP growth rate slowed, commodity prices were rising and state tax revenues reached all-time highs. Flush with a revenue surplus, Governor Kathleen Blanco increased state spending beyond the post-Katrina rebuilding efforts, spending more on health and education services, for example, giving $1,500 raises to public-school teachers, $500 raises to other school employees, and boosting university faculty salaries by 5%. Unfortunately, Louisiana's economic "boom" was short-lived, and with her economy relying heavily on the volatile cycles of the mining and manufacturing sectors, the state's post-Katrina prosperity ended abruptly even before the Great Recession in 2008 and again after a steep drop in global oil prices the following year.

The state's tax policy only exacerbated Louisiana's economic plight. In 2003, the state legislature enacted the "Stelly Plan"—a tax plan that gave sales tax exemptions for food and utilities, and increased the personal income tax. Before the Stelly Plan, individuals were taxed at 4% on income between $10,000 and $50,000, and at 6% on income over $50,000. Under the Stelly Plan, the 4% rate applied to income between $12,500 and $25,000, with a 6% rate on income over $25,000. The Plan boasted huge increases in income tax revenues, reaching all-time highs from 2007-2009, just as private investments in the state fell well before the Great Recession. By raising tax rates on labor and investment, and by shrinking the consumption tax base, the Stelly Plan epitomized unsound tax policy. Economists largely reject policies like the Stelly Plan, preferring instead lower tax rates and broader bases for the best pro-growth strategy.

Regrettably, by raising tax rates and imposing high income taxes, Louisiana provided another example of how government taxing and spending policies negatively affect economic growth (Folster and Henrekson, 2001). Many economic studies have shown in particular that levying high income taxes instead of consumption taxes penalizes investments on labor and capital, thereby creating a worse economic environment. Several studies demonstrate that tax policies that penalize investment are more harmful to productive economic activity than taxes on consumption (Arnold et al., 2011; Gemmell, Kneller, & Sanz, 2011; Romer and Romer, 2010; Blanchard and Perotti, 2002; Padovano and Galli, 2001; Gemmell and Kneller, 2001; Mullen and

Martin, 1994). Louisiana proved no exception to this general rule, and the Stelly Plan would inflict negative consequences. By the end of the Great Recession, Louisiana suffered significant budget shortfalls and faced a stalled economy. To spur the economy, the legislature partially repealed the misguided Stelly Plan by resetting the income tax brackets and rates to their pre-Stelly targets. The Plan's sales tax exemptions remained, however, which kept the state's tax base relatively narrow—a hallmark of unsound tax policy that helps explain why tax revenues fell short of expectations even after the state reversed half of the Stelly Plan.

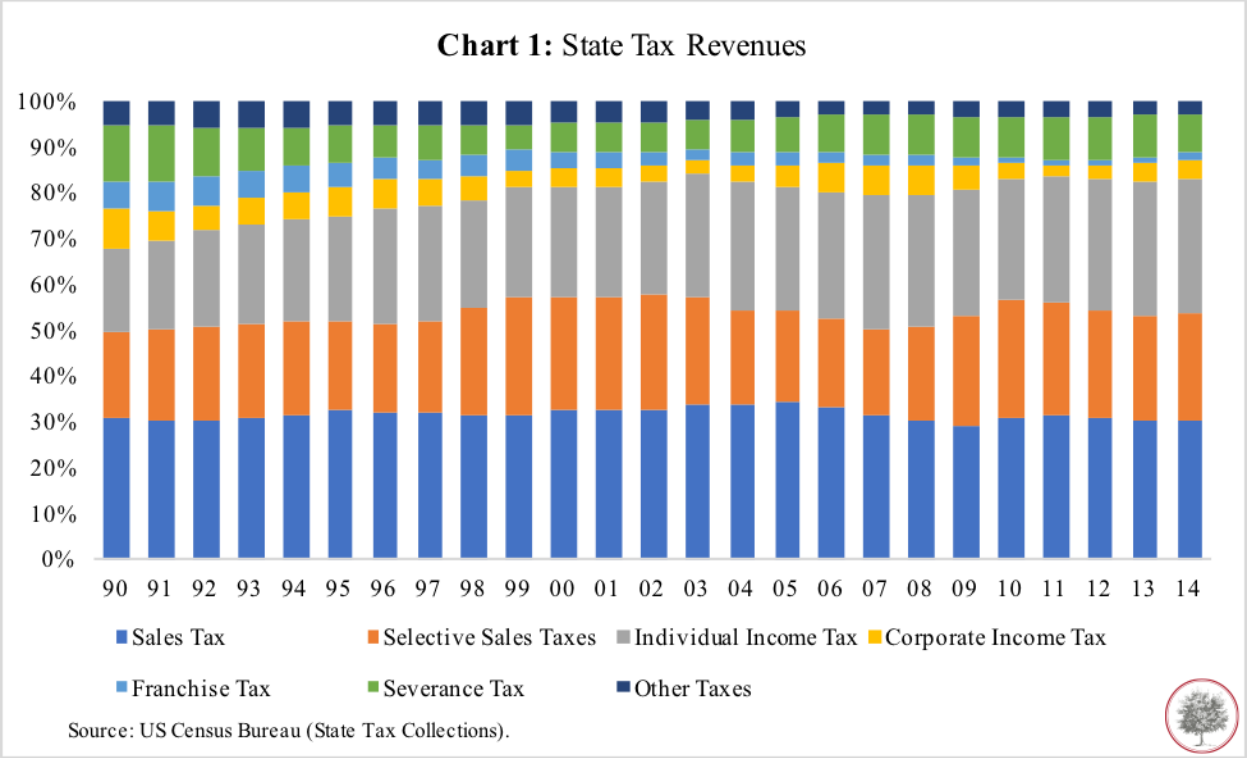
As tax revenues failed to meet expectations, the Pelican State continued to over-spend. Some spending increases implemented during the "good ole' days" were never curtailed, setting a course for perpetually higher spending.

In addition to direct spending increases, Louisiana has also continued to add a variety of tax exemptions. Tax exemptions are actually another form of tax expenditures. As Congress's Joint Tax Committee has explained, tax exemptions "may be analogous to direct outlay programs and may be considered an alternative means of accomplishing similar budget policy objectives" (US Joint Tax Committee 2017). This is because when the state spends money—either through a direct spending outlay or a tax exemption—taxes on other goods or services must be higher in order to pay for the additional spending. Such spending programs ultimately redirect economic resources, thereby contributing to slower growth.

As most of the country recovered from the Great Recession, Louisiana's economy only worsened. Hindered by a complex, inefficient tax code and turbulent commodity markets, a stagnant economy has forced Louisiana to dip into its "Rainy Day Fund" several times, while temporarily cutting discretionary spending on healthcare and higher education. The state has voted routinely to raise taxes in order to balance the budget, while tax reform proposals have been rejected in the legislature and by public referendum. But to resolve its perennial budget crisis, Louisiana must adopt a more permanent tax and spending structure that will foster real and sustained economic growth.

Tax Policy in Louisiana

Louisiana generates most of her state revenues from six major sources. According to the U.S. Census Bureau's Annual Survey of State Tax Collections (STC), in fiscal year 2015, 31% of Louisiana's tax revenue came from the individual income tax, 30% of tax revenue from the general sales tax, and 24% came from other select sales and excise taxes. Unfortunately, as the Tax Foundation has reported, Louisiana has the worst sales tax system in the nation, with local sales taxes piggybacking on a moderately high state sales tax of 5% —making her state-local average sales tax rate the nation's highest at nearly 10%. Severance taxes, corporate income taxes, and corporate license taxes provide other revenue streams.



In addition to these state-generated revenues, Louisiana also receives significant federal funds that actually exceed the state tax revenues. According to the U.S. Census Bureau's Annual Survey of State Government Finances, in 2015, the federal government gave Louisiana over $10 billion—or 5% of state GDP compared to 4% of GDP collected from in-state taxation.

Two-thirds of Louisiana's spending is "non-discretionary," which means that the state constitution or the federal government requires it. Non-discretionary spending includes salaries for elected officials, Medicaid services, and other government operations. Remaining funds are considered discretionary and may be adjusted and spent as the state sees fit. Recently, however, Louisiana has failed to generate enough revenue to cover her expenses, leading to chronic budget shortfalls. Policymakers largely have attempted temporary and "one-time" solutions, and have not yet adopted a sustainable, long-term answer to address the systemic cause of the problem. And instead of pursuing tax reforms that would reduce budget shortfalls through organic economic growth and investment, many of Louisiana's recent tax initiatives—such as alcohol tax hikes and temporarily raising the sales tax from 4% to 5% —have only stymied recovery.

Louisiana Governor John Bel Edwards has prioritized fixing the state's budget woes and has proposed a tax on all commercial activity, similar to the one levied in Ohio. The Governor's proposal will likely do more economic harm than good. Ohio's commercial activity tax (CAT) is a gross-receipts tax on sales, services, rentals, and leases with very few exemptions. Because Ohio's CAT is based on gross receipts, individuals or businesses with low profit margins are disproportionately disadvantaged. Unlike a sales tax that only applies once to the value of final products, the CAT taxes intermediate goods and raw materials as well. Although these taxation layers quickly generate tax revenue, they also tend to cascade through the value-added chain and

distort the relative prices of business inputs, particularly capital goods (Bird and Smart, 2008; and Ring, 1989). This cascading effect makes gross receipts taxes one of the most economically harmful forms of taxation (Chamberlain and Fleenor, 2007).

Better Tax Strategies for Growth

State tax codes affect more than just state budgets. Sound tax policy accomplishes its goal of collecting sufficient revenue for the state without discouraging economic growth by following several fundamental principles. First, good tax codes make states more attractive to new and relocating businesses. Second, tax rates should remain low and be applied fairly across a broad base in order to minimize disincentives to investment and prevent the government from picking economic "winners" and "losers." Third, sound tax systems should be stable in order to reduce uncertainty and facilitate investment decisions. Fourth, tax codes should avoid multiple layers of taxation that also tend to discourage private savings. And finally, a sound tax policy does not discourage labor supply and job creation. Economists agree that corporate taxes penalize investment and, consequently, do the most harm to economic growth. By contrast, economists contend that broad, low-rate consumption taxes have significantly less economic impact. Louisiana's current tax structure does not adhere to these basic principles and several of the state's tax policies have opened significant potholes on the road to economic recovery.

Louisiana has a high corporate income tax riddled with complicated deductions. Her top corporate tax rate of 8% is higher than any other Sunbelt state, with no other state in the region imposing a rate over 6.5%, and the array of tax exemptions makes it one of the most complex in the nation. This high-rate, complicated corporate tax structure hurts economic growth by reducing returns on investment, which tends to reduce capital available for productive sectors and thereby weakens the economy over the long-term. Not surprisingly, therefore, Louisiana remains unattractive to businesses and investors. The Tax Foundation's 2017 State Business Tax Climate Index ranks Louisiana 41st out of 50 states, and an economic outlook forecast in the book Rich States, Poor States (Laffer et al., 2016) puts Louisiana in the country's bottom half. To move up the economic ladder and make herself more attractive to investors, Louisiana should eliminate many of her corporate tax deductions and end or at least reduce the state's corporate income and franchise taxes.

Tax exemptions and deductions create "winners" and "losers" in the market. To reduce the effective rate for some, a higher rate must be imposed on others in order to recoup the exemption's foregone revenue. When governments unfairly pick winners and losers in this way, they inevitably distort markets leading to inefficient economic outcomes.

The Pelican State's top marginal personal income tax rate is higher than nearly every one of her neighbors, which discourages labor supply and makes the state less economically attractive than her peers. Not only does the personal income tax add another taxation layer on top of the federal income tax, but its labyrinth of exemptions and deductions make it one of the country's most complex. Although rolling back the Stelly Plan and adjusting the income tax brackets were steps in the right direction, Louisiana could be more competitive by lowering the marginal tax rates and eliminating many of the income tax deductions and credits that distort economic decisions.

Louisiana is one of the few states in the country that allows taxpayers to deduct their federal income tax payments from their state income tax liability. The state estimates that the federal tax deduction reduces state revenues by over $800,000,000 annually. More than just the sizable cost to the state's coffers, such deductions destabilize Louisiana's revenues by leaving them vulnerable to changes in federal tax policies. When, for example, the federal government raises taxes, Louisiana's revenues fall as state taxpayers claim a larger federal tax deduction on their state tax return—a problem exacerbated by the progressive income tax that gives taxpayers in higher brackets a larger deduction. Conversely, when Washington cuts federal taxes, Louisianans may claim smaller deductions on state taxes, thereby reaping less of the federal benefit than taxpayers in neighboring states. Eliminating the federal tax deduction will help stabilize state revenues and make Louisiana more competitive in the region.

Finally, Louisiana's severance tax on mineral producing industries—that accounts for almost 4% of the state's total tax revenues—is notoriously volatile due to rapid changes in the commodities market. Such volatility makes the tax base and its revenues less stable. Furthermore, high severance taxes reduce the incentives for companies to explore and expand resource extraction operations. Some states, such as Wyoming and Alaska, that rely heavily on severance taxes have created reserve accounts to help stabilize revenues and offset revenue reductions when commodity prices decline. Louisiana should pursue a similar strategy in order to stabilize the tax base. Louisiana should also stop capping its "rainy day fund" contributions in order to take full advantage of commodity booms by saving as much as possible. Removing the "rainy day fund" cap would help make Louisiana less vulnerable to volatile swings in commodity prices that can dramatically affect her severance taxes.

Tax Policy Scenarios and Results

Think tanks, legislators, and policymakers have proposed a variety of fiscal policy reforms to guide Louisiana to stronger economic growth and fiscal stability. Applying a dynamic macroeconomic model of Louisiana's economy, which accounts for businesses and individuals changing their behavior in response to fiscal policy changes, we provide 12 scenarios that highlight the potential effects of tax policy changes on the Louisiana economy. The economic model and the assumptions drawn from the academic economics literature are explained in this report's appendices. The predicted effects on GDP, employment, and total tax revenues of each scenario are provided in tables. The simulated scenarios illustrate the likely deviations from the baseline model, which represents Louisiana's status quo economy (given the assumptions and specifications described in Appendix A).

Scenario I: Eliminating Louisiana's General Sales Tax Exemptions

Consumption taxes are the most economically efficient way to generate revenue without impacting economic growth. A temporary sales tax increase can encourage saving and investment, which spurs job creation in the long-run. Thus, many countries, particularly in Europe, have shifted away from corporate income taxes to sales or value-added taxes.

Unfortunately, Louisiana's sales tax policy also includes a significant number of exemptions (e.g., food, gasoline, electricity, and pharmaceuticals). Local governments and state legislators partner to allow local governments to set local tax rates and create local sales tax bases that differ from the state's sales tax base. The more exemptions allowed, the higher the overall tax rate must be to meet the state's revenue target. Unsurprisingly, given this patchwork of exemptions and localized tax rates, Louisiana has the highest combined state and local sales tax rate in the nation.

To analyze the impact of Louisiana's sales tax policy, our economic model simulates eliminating all of the currently available exemptions to the state's general sales tax. Under this scenario, our model predicts additional tax revenues but a negative overall effect on Louisiana's GDP.

As our model demonstrates, a permanent increase in the effective sales tax will make goods and services more expensive, which will reduce the demand for the goods and services subject to the tax. We predict a lower state GDP as production adjusts to lower demand, which, in turn, will reduce investment and employment (see Table 1). Ultimately, a sales tax increase of this magnitude would harm the state's economic growth dramatically. The simulated policy would reduce Louisiana's GDP by approximately $1.4 billion relative to the baseline level—that is, Louisiana's status quo GDP without the policy. Similarly, under this simulation, job opportunities decline by 13,100, even as Louisiana's tax revenues immediately increase by $1 billion after all exemptions are eliminated.

Table 1: Effects of Scenario I

	Baseline			Difference from Baseline		
Year	**GDP**	**Employment**	**Tax Revenues**	**GDP**	**Employment**	**Tax Revenues**
2018	219,804	2,076,400	9,086	-1,366	-13,100	1,045
2019	223,283	2,093,900	9,230	-1,388	-13,200	1,061
2020	226,818	2,111,600	9,376	-1,410	-13,300	1,078
2021	230,408	2,129,500	9,524	-1,432	-13,400	1,095
2022	234,055	2,147,500	9,675	-1,455	-13,500	1,113
2023	237,759	2,165,600	9,828	-1,478	-13,700	1,130
2024	241,522	2,183,900	9,984	-1,501	-13,800	1,148
2025	245,345	2,202,400	10,142	-1,525	-13,900	1,166

Note: GDP and tax revenues in millions of 2009$.
Employment in units of full-time equivalent non-farm jobs, rounded to the nearest hundred.

Scenario II: Eliminating Louisiana's Corporate Income Tax

Louisiana currently levies a graduated corporate income tax schedule with an initial rate of 4% and a top rate of 8%. The corporate tax brackets include four different rates for earned income between $0 and $100,000. Beginning at $100,000 of earned income, Louisiana corporations pay 7% (higher than neighboring states), and pay the top 8% rate on earnings over $200,000.

To offset these high statutory rates, Louisiana offers corporations many deductions and exemptions. Corporate exemptions, as defined, include "all exemptions, exclusions, deductions, credits, rebates, preferential tax treatments, and tax deferrals. Tax exemptions are tax dollars that are not collected and result in a loss of state tax revenues available for appropriation."[1] Louisiana estimates that the value of these corporate exemptions totals over $2 billion, which is almost ten times the corporate tax revenue that Louisiana collects.[2]

A high statutory tax rate offset by a complex array of deductions is not a sound tax policy. Under Louisiana's current system, corporations look for ways to meet deduction and exemption requirements in order to pay a lower tax rate. Thus, some corporations pay higher rates than others simply because they have discovered creative ways to satisfy exemption requirements. A better approach would lower the statutory rate across the board and eliminate deductions and exemptions. An even more pro-growth policy would eliminate the corporate tax entirely and transition Louisiana away from income taxes.

Scenario II provides a counterfactual Louisiana economy that has eliminated the corporate income tax. By doing so, the model reveals that corporate income taxes impose a negative impact on state GDP and employment for each additional dollar of tax revenue collected (see Table 2). Eliminating taxes on corporate income is the most pro-growth tax reform available because it increases the capital stock, making labor more productive, which raises wages and living standards. Our findings are consistent with other economics literature, including, the empirical evidence provided by Shuai and Chmura (2013) showing that states that cut corporate tax rates benefit from faster employment growth than states that do not cut corporate taxes; and Mertens and Ravn's (2013) conclusion that a 1% drop in the average corporate income tax rate actually expands the corporate income tax base, indicating significant behavioral responses to corporate income taxes.

Table 2: Effects of Scenario II

	Baseline			Difference from Baseline		
Year	**GDP**	**Employment**	**Tax Revenues**	**GDP**	**Employment**	**Tax Revenues**
2018	219,804	2,076,400	9,086	769	11,800	-288
2019	223,283	2,093,900	9,230	1,384	12,800	-271
2020	226,818	2,111,600	9,376	1,429	12,200	-269
2021	230,408	2,129,500	9,524	1,452	11,700	-273
2022	234,055	2,147,500	9,675	1,498	11,200	-270
2023	237,759	2,165,600	9,828	1,522	10,600	-274
2024	241,522	2,183,900	9,984	1,570	10,300	-271
2025	245,345	2,202,400	10,142	1,595	10,400	-275

Note: GDP and tax revenues in millions of 2009$.
Employment in units of full-time equivalent non-farm jobs, rounded to the nearest hundred.

Scenario III: Introduction of a Commercial Activity Tax

A commercial activity tax (CAT) levies a tax on a business's gross receipts, not its profits. Gross receipts include all goods and services produced or performed by a business, including rents from real property or capital. Thus, a CAT is a "pancaking" or "pyramid" tax structure that affects every stage of production. Even though a CAT's statutory rate may be low, the final tax rate will be high for any product or service that involves multiple stages of production because every business that plays a part in the production will pay the CAT. For example, the final effective CAT on an automobile would involve CATs being paid by rubber mills, tire makers, steel mills, paint factories, wire and plastics companies, etc. Furthermore, gross receipts taxes offer no deductions for business expenses and, unlike a value-added tax, CATs tax more than merely the additional value created by each stage of production.

Many states have moved away from assessing CATs because they damage state economies by forcing businesses to pay substantial tax bills even if the business loses money or is not profitable (see Kaeding and Wilt, 2016). Because a CAT is essentially "a tax on the privilege of doing business," CATs inevitably reduce output, wages, and investment, thus lowering state GDPs (Ohio Tax Reform Task Force, 2016). Nevertheless, five states still impose some form of gross receipts taxes that range in complexity.

Scenario III simulates how an Ohio-style CAT—using a statutory rate of 0.3% —would affect Louisiana's economy (see Table 3). Ohio is the only state that levies both a CAT and an individual income tax, and her unique, streamlined CAT does not have many different rates or classifications for its tax base. Thus, many business groups believe that the Ohio CAT will work effectively provided that the tax rate does not change and the base remains broad.

Table 3: Effects of Scenario III

	Baseline			Difference from Baseline		
Year	**GDP**	**Employment**	**Tax Revenues**	**GDP**	**Employment**	**Tax Revenues**
2018	219,804	2,076,400	9,086	-1,363	-11,200	260
2019	223,283	2,093,900	9,230	-1,898	-11,900	251
2020	226,818	2,111,600	9,376	-1,951	-11,400	247
2021	230,408	2,129,500	9,524	-1,982	-11,100	244
2022	234,055	2,147,500	9,675	-2,036	-10,500	248
2023	237,759	2,165,600	9,828	-2,069	-10,200	252
2024	241,522	2,183,900	9,984	-2,101	-9,800	248
2025	245,345	2,202,400	10,142	-2,135	-9,500	252

Note: GDP and tax revenues in millions of 2009$.
Employment in units of full-time equivalent non-farm jobs, rounded to the nearest hundred.

Scenario IV: Eliminating Louisiana's Franchise Tax

Scenario IV simulates the effects of eliminating the franchise tax in Louisiana. Franchise taxes levy taxes on business assets. Taxing assets effectively taxes capital, thereby reducing incentives for capital investment and accumulation, which makes franchise taxes some of the most economically damaging forms of taxation. Not surprisingly, most states do not assess franchise taxes, and only eight states do not limit the taxes paid under the franchise tax. Louisiana, however, assesses a franchise tax at rates of $1.50 per $1000 of capital up to $300,000, and $3.00 per $1,000 dollars of capital after $300,000.

Our model simulation predicts that eliminating Louisiana's franchise tax would yield two primary outcomes: it would boost the state's GDP by stimulating investment and spurring employment; and it would cause an immediate decline in Louisiana's tax revenues (see Table 4).

Table 4: Effects of Scenario IV

	Baseline			Difference from Baseline		
Year	**GDP**	**Employment**	**Tax Revenues**	**GDP**	**Employment**	**Tax Revenues**
2018	219,804	2,076,400	9,086	593	9,600	-219
2019	223,283	2,093,900	9,230	1,049	10,300	-209
2020	226,818	2,111,600	9,376	1,089	9,700	-205
2021	230,408	2,129,500	9,524	1,106	9,400	-208
2022	234,055	2,147,500	9,675	1,123	9,000	-204
2023	237,759	2,165,600	9,828	1,165	8,400	-208
2024	241,522	2,183,900	9,984	1,183	8,100	-203
2025	245,345	2,202,400	10,142	1,202	7,900	-207

Note: GDP and tax revenues in millions of 2009$.
Employment in units of full-time equivalent non-farm jobs, rounded to the nearest hundred.

Scenario V: Excluding Federal Deductions on Louisiana's Corporate Income Tax

Louisiana allows corporations to deduct federal tax payments from state tax collections. Like the federal individual income tax deduction, this deduction adds volatility and makes Louisiana more susceptible to changes in federal tax policy. Eliminating this deduction and reducing the state's corporate income tax rate would minimize economic distortions, reduce tax volatility, and maximize economic growth. Merely eliminating federal deductions without sufficient cuts to the corporate tax rate, however, will raise the tax burden on Louisiana households and businesses.

Our model simulation estimates the effect of not granting federal tax deductions (see Table 5). We calculated a new effective corporate income tax rate by adding the foregone tax revenues ($66 million, as estimated by Louisiana) to the actual tax revenues for each year. This yields an effective tax rate of $\tau^{corp} = 0.008$ instead of $\tau^{corp} = 0.007$. Our model predicts that due to the higher cost of capital the Louisiana economy would slow and nearly two thousand job opportunities would be lost relative the baseline economy.

Table 5: Effects of Scenario V

	Baseline			Difference from Baseline		
Year	**GDP**	**Employment**	**Tax Revenues**	**GDP**	**Employment**	**Tax Revenues**
2018	219,804	2,076,400	9,086	-220	-1,900	27
2019	223,283	2,093,900	9,230	-198	-1,800	28
2020	226,818	2,111,600	9,376	-203	-1,800	28
2021	230,408	2,129,500	9,524	-208	-1,800	29
2022	234,055	2,147,500	9,675	-212	-1,900	29
2023	237,759	2,165,600	9,828	-217	-1,900	30
2024	241,522	2,183,900	9,984	-221	-1,900	30
2025	245,345	2,202,400	10,142	-226	-1,900	31

Note: GDP and tax revenues in millions of 2009$.
Employment in units of full-time equivalent non-farm jobs, rounded to the nearest hundred.

Scenario VI: Allowing the FY2016 1% Sales Tax Increase to Expire

In April 2016, Louisiana's statutory sales tax rose from 4% to 5%. That 1% increase, however, is scheduled to expire so that the sales tax will revert back to 4% at the end of fiscal year 2018.3 Governor Edwards estimates that allowing the tax hike to expire and return to 4% will reduce Louisiana's tax collections by almost one billion dollars in the first year after the tax increase expires.

Scenario VI simulates the effect of allowing the sales tax increase to expire as scheduled rather than maintaining the current 5% rate (see Table 6). If Louisiana's sales tax increase expires on schedule, our model predicts that the economy will grow again and some employment opportunities (lost after the tax increase) will return. Allowing the sales tax increase to expire will increase demand for consumer goods, resulting in higher output and more employment opportunities.

Table 6: Effects of Scenario VI

	Baseline			Difference from Baseline		
Year	**GDP**	**Employment**	**Tax Revenues**	**GDP**	**Employment**	**Tax Revenues**
2018	219,804	2,076,400	9,086	418	4,200	-312
2019	223,283	2,093,900	9,230	424	4,200	-317
2020	226,818	2,111,600	9,376	431	4,200	-322
2021	230,408	2,129,500	9,524	438	4,300	-327
2022	234,055	2,147,500	9,675	445	4,300	-332
2023	237,759	2,165,600	9,828	452	4,300	-337
2024	241,522	2,183,900	9,984	459	4,400	-342
2025	245,345	2,202,400	10,142	466	4,400	-348

Note: GDP and tax revenues in millions of 2009$.
Employment in units of full-time equivalent non-farm jobs, rounded to the nearest hundred.

Scenario VII: Repealing Some State Sales Tax Exemptions

Governor Edwards proposes repealing some of Louisiana's sales tax exemptions in order to broaden the tax base and recoup some of the revenues lost by the scheduled 1% reduction in the statutory rate. The Governor optimistically projects that his proposal will increase state revenues by $180 million. As discussed in Scenario I, sound tax policy limits sales tax exemptions; but repealing tax exemptions also requires lowering the tax rate to avoid increasing the tax burden and harming the economy in an effort to increase tax revenues.

Contrary to the Governor's projections, our dynamic model predicts that the proposed policy would boost state revenues by only $151 million. Furthermore, our simulation estimates that the Governor's proposal would reduce employment opportunities in Louisiana by 1,600 relative to the long-run employment trend. The forgone employment opportunities will occur because repealing tax exemptions lowers demand for goods that are no longer tax-exempt. The lower demand, in turn, will cause lower output (see Table 7). Broadening the tax base, however, will distort the economy less than increasing the statutory tax rate (the effects of Scenario VI are larger than Scenario VII).

Table 7: Effects of Scenario VII

	Baseline			Difference from Baseline		
Year	**GDP**	**Employment**	**Tax Revenues**	**GDP**	**Employment**	**Tax Revenues**
2018	219,804	2,076,400	9,086	-195	-1,600	151
2019	223,283	2,093,900	9,230	-198	-1,600	153
2020	226,818	2,111,600	9,376	-201	-1,700	156
2021	230,408	2,129,500	9,524	-205	-1,700	158
2022	234,055	2,147,500	9,675	-208	-1,700	161
2023	237,759	2,165,600	9,828	-211	-1,700	163
2024	241,522	2,183,900	9,984	-215	-1,700	166
2025	245,345	2,202,400	10,142	-218	-1,700	168

Note: GDP and tax revenues in millions of 2009$.
Employment in units of full-time equivalent non-farm jobs, rounded to the nearest hundred.

Scenario VIII: Extending the Sales Tax to Certain Services

Scenario VIII simulates the effects of the Governor's proposal to extend the state sales tax to some services that are not currently taxed, such as digital streaming, and telephone or security services. The Governor's static estimate predicts that such an extension will add approximately $200 million in state tax revenue. Unfortunately, the Governor's calculations are overly optimistic and, unlike our dynamic model, do not account for the behavioral impact of his proposed tax increase.

Our dynamic model uses the Governor's estimated revenue increase to calculate the new share of taxable consumption expenditures after the policy is introduced. Our model projects that under the Governor's proposal real economic output would decline by over $212 million (2009 dollars) and Louisiana would see 2,400 fewer employment opportunities in the new tax's first year (see Table 8).

Table 8: Effects of Scenario VIII

	Baseline			Difference from Baseline		
Year	**GDP**	**Employment**	**Tax Revenues**	**GDP**	**Employment**	**Tax Revenues**
2018	219,804	2,076,400	9,086	-212	-2,400	171
2019	223,283	2,093,900	9,230	-215	-2,500	174
2020	226,818	2,111,600	9,376	-218	-2,500	177
2021	230,408	2,129,500	9,524	-222	-2,500	180
2022	234,055	2,147,500	9,675	-225	-2,500	182
2023	237,759	2,165,600	9,828	-229	-2,500	185
2024	241,522	2,183,900	9,984	-232	-2,600	188
2025	245,345	2,202,400	10,142	-236	-2,600	191

Note: GDP and tax revenues in millions of 2009$.
Employment in units of full-time equivalent non-farm jobs, rounded to the nearest hundred.

Scenario IX: Reducing Louisiana's Individual Income Tax Credits

Governor Edwards plans to reduce or eliminate some of Louisiana's current individual income tax credits, rebates, exemptions, and deductions. Using IRS tax data, we find that removing tax credits will mostly affect individuals earning more than $50,000 per year. The state's static estimate suggests that the Governor's proposal would increase tax revenues by $193 million. Our dynamic model, however, estimates the proposed policy's broader effect on Louisiana's economy, most notably an immediate decline of nearly $390 million in GDP after the tax hike with only $96 million of additional tax revenue (see Table 9).

Taxing labor income penalizes labor, making leisure more attractive, which decreases labor supply (Harris and Mok, 2015). As individuals respond to tax increases, employment falls and the marginal product of capital declines, causing investment and GDP to fall. Conversely, research shows that a 1% income tax cut will cause GDP to rise by up to 1.8% in subsequent quarters (Mertens and Ravn, 2013).

Table 9: Effects of Scenario IX

	Baseline			Difference from Baseline		
Year	**GDP**	**Employment**	**Tax Revenues**	**GDP**	**Employment**	**Tax Revenues**
2018	219,804	2,076,400	9,086	-390	-800	96
2019	223,283	2,093,900	9,230	-397	-800	97
2020	226,818	2,111,600	9,376	-403	-800	99
2021	230,408	2,129,500	9,524	-409	-800	101
2022	234,055	2,147,500	9,675	-416	-800	102
2023	237,759	2,165,600	9,828	-422	-800	104
2024	241,522	2,183,900	9,984	-429	-900	105
2025	245,345	2,202,400	10,142	-436	-900	107

Note: GDP and tax revenues in millions of 2009$.
Employment in units of full-time equivalent non-farm jobs, rounded to the nearest hundred.

Scenario X: Replacing Louisiana's Corporate Income Tax with a Revenue Neutral Commercial Activity Tax

Replacing Louisiana's corporate income tax with a CAT would have several effects (see Table 10). First, removing the corporate income tax would increase the capital stock that lifts economic output and improves living standards by making labor more productive. Under this scenario, however, GDP would shrink by approximately $747 million because of the CAT's adverse effects. A new CAT, for example, would lower output and real wages, which would then raise the value of leisure relative to market hours and negate the benefits of eliminating the corporate income tax. Some of the CAT's adverse effects will eventually be mitigated as the positive effects of eliminating the corporate income tax permeate the economy after several years.

Table 10: Effects of Scenario X

	Baseline			Difference from Baseline		
Year	**GDP**	**Employment**	**Tax Revenues**	**GDP**	**Employment**	**Tax Revenues**
2018	219,804	2,076,400	9,086	-747	-400	0
2019	223,283	2,093,900	9,230	-715	-400	0
2020	226,818	2,111,600	9,376	-726	-400	7
2021	230,408	2,129,500	9,524	-737	-400	7
2022	234,055	2,147,500	9,675	-749	-400	7
2023	237,759	2,165,600	9,828	-761	-400	7
2024	241,522	2,183,900	9,984	-749	-400	8
2025	245,345	2,202,400	10,142	-749	0	8

Note: GDP and tax revenues in millions of 2009$.
Employment in units of full-time equivalent non-farm jobs, rounded to the nearest hundred.

Scenario XI: Replacing Louisiana's Corporate Income Tax with a Revenue Neutral Removal of Sales Tax Exemptions

Corporate tax rates help companies decide where to incorporate and expand their businesses (see Devereux and Griffith, 2003). Thus, many international corporate tax rates have declined recently, while the use of consumption-based taxes has increased.

Scenario XI simulates Louisiana replacing her corporate income tax with a revenue neutral sales tax increase—a course recommended by most economists. Our dynamic model predicts that Louisiana would enjoy higher economic output after eliminating the corporate income tax. A higher tax rate on the sale of goods and services, however, raises the price of goods and services, which lowers the demand for those goods and services.

Our simulation predicts that employment will increase because sales taxes cause fewer price distortions while still raising additional revenue (see Table 11). A revenue neutral removal of 8.5% of sales tax exemptions (to replace the corporate income tax) will yield higher returns on capital investments that cause labor supply and GDP to increase. Our model suggests that Scenario XI will be the best tax strategy for the Louisiana economy. The policy is revenue neutral, which means that tax revenues will not change in the first year. Over time, however, eliminating the corporate income tax will stimulate greater economic activity, which is why GDP will continue to rise after the new policy is enacted.

Table 11: Effects of Scenario XI

	Baseline			Difference from Baseline		
Year	**GDP**	**Employment**	**Tax Revenues**	**GDP**	**Employment**	**Tax Revenues**
2018	219,804	2,076,400	9,086	427	8,600	0
2019	223,283	2,093,900	9,230	1,037	9,500	21
2020	226,818	2,111,600	9,376	1,076	8,900	28
2021	230,408	2,129,500	9,524	1,093	8,400	29
2022	234,055	2,147,500	9,675	1,134	7,800	36
2023	237,759	2,165,600	9,828	1,152	7,200	37
2024	241,522	2,183,900	9,984	1,194	6,800	45
2025	245,345	2,202,400	10,142	1,213	6,900	46

Note: GDP and tax revenues in millions of 2009$.
Employment in units of full-time equivalent non-farm jobs, rounded to the nearest hundred.

Scenario XII: Adopting Aspects of Governor Edwards' Proposal

Our final simulation examines the potential effects of adopting some of Governor Edwards' tax proposals (Scenarios V-IX), based on the Administration's own static revenue estimates. These scenarios include changes to the federal deductions on the state corporate tax return, changes to the sales tax base, expiration of the temporary one percent sales tax increase and reduction in state income tax exemptions. This scenario does not include the gross receipts tax. Although the Governor's proposal estimates over $100 million in additional tax revenues each year, the state's GDP and employment will decline, and the added tax revenues will not cover Louisiana's annual budget shortfall. Our model predicts that the Governor's proposed gross receipts tax alone will likely cause a great deal of economic harm (see Table 12). The proposed gross receipts tax will raise marginal costs, thus reducing output at every level of production and causing employment and real wages to decline, making Louisiana less competitive relative to her peers.

Table 12: Effects of Scenario XII

	Baseline			Difference from Baseline		
Year	**GDP**	**Employment**	**Tax Revenues**	**GDP**	**Employment**	**Tax Revenues**
2018	219,804	2,076,400	9,086	-599	-2,500	134
2019	223,283	2,093,900	9,230	-583	-2,500	136
2020	226,818	2,111,600	9,376	-595	-2,600	138
2021	230,408	2,129,500	9,524	-606	-2,500	140
2022	234,055	2,147,500	9,675	-616	-2,600	142
2023	237,759	2,165,600	9,828	-627	-2,600	145
2024	241,522	2,183,900	9,984	-638	-2,700	147
2025	245,345	2,202,400	10,142	-650	-2,700	149

Note: GDP and tax revenues in millions of 2009$.
Employment in units of full-time equivalent non-farm jobs, rounded to the nearest hundred.

Conclusion

The budget woes that Louisiana has battled for the last decade show no sign of abating. The state fares poorly in national business climate rankings and her relatively high tax rates combined with a cumbersome tax system drag on Louisiana's economic growth. State policymakers rightly recognize that fundamental changes are needed.

This report explores a range of simulated fiscal policy scenarios, including changes in Louisiana's current corporate and sales tax structure, and implementing new taxes such as a gross receipts tax, in order for policymakers to better understand the economic costs and benefits of various policy options. Some scenarios reflect multiple, simultaneous changes to Louisiana's tax code such that the simulated reforms effectively nullify each other. Thus, for example, eliminating the corporate income tax should produce more economic growth, but that growth may be negated by other policy changes designed to recoup the lost corporate tax revenues.

Our dynamic model of Louisiana's economy reveals that eliminating the state's corporate income and franchise taxes offer the best path for spurring economic growth. We also find that eliminating some sales tax exemptions will have the least harmful effect on the state's GDP while still raising additional tax revenue. These predictions are consistent with other economic research demonstrating that consumption-based taxes are the least economically disruptive, while corporate taxes harm economic prospects the most.

Finally, the Governor's new tax proposal that includes a commercial activity tax will hinder capital investment and cost Louisiana jobs in the long-run. The Governor's proposed plan will increase the state's overall tax burden, which will likely boost state revenues, but will also reduce employment opportunities and shrink Louisiana's GDP. Rather than pursue revenues through a greater tax burden, Louisiana will be better served by reducing or eliminating corporate taxes, and creating incentives for increasing investment and employment across the state.

Endnotes

[1] Louisiana Department of Revenue, "Tax Exemption Budget 2015-2016," 2015.
[2] ibid.
[3] ibid.

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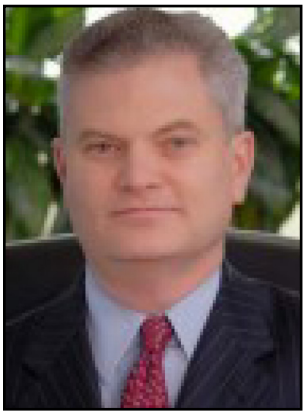

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APPENDIX A: TAX POLICY IN A SMALL OPEN ECONOMY REAL BUSINESS CYCLE MODEL

The Basic Model

Time is discrete and lasts forever. Every period, the economy is populated by heterogeneous households specialized in the production of one of (s) types of goods. Since the Bureau of Economic Analysis reports macroeconomic data for US states in yearly intervals, a period is assumed to be a year in this framework. Each sector (s) is populated by a large number of identical firms. The economy also features a government sector that collects taxes and purchases goods from all sectors. A share $q^{h,e} \in (0,1)$ of households has earning ability $e = \{1, \dots, E\}$. These shares are such that the total population is $\sum q^{h,e} = 1$. The share of households with the required skills to work in sector s is $\mu_{e,s} \in (0,1)$ such that $\sum \mu_{e,s} = 1$.

The Household Problem

Each household chooses consumption c_t, savings $k_t(s)$, how much to borrow $d_t(s)$ and market hours $l_t(s)$, to solve the following problem:

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

subject to the following constraints:

$$d_{e,t} = \zeta(1+\tau_t^c)\sum_{s=1}^{S} c_{e,t}(s) + (1-\zeta)\sum_{s=1}^{S} c_{e,t}(s) + \sum_{s=1}^{S} x_{e,t}(s) + (1+r_{t-1})d_{e,t-1}$$
$$+ \tau_t^k \sum_{s=1}^{S} k_{e,t-1}(s) + \left[\frac{\phi}{2}\left(\sum_{s=1}^{S} k_{e,t}(s) - \sum_{s=1}^{S} k_{e,t-1}(s)\right)^2\right] - (1-\tau_{e,t}^{i,s} - \tau_t^l$$
$$- \tau_{e,t}^{i,f})\sum_{s=1}^{S} w_{e,t}(s) l_{e,t}(s) - (1-\tau_{e,t}^{i,s} - \tau_t^l - \tau_{e,t}^{i,f} - \tau_t^{corp})\sum_{s=1}^{S} r_t(s) k_{e,t-1}(s)$$

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

$$c_{e,t}(s) \geq 0,\; l_{e,t}(s) \in [0,1],\; k_{e,0}(s) \geq 0,\; k_{e,T+1}(s) = 0$$

$$U(c_t) = \sum_{s=1}^{S} \alpha_s ln\big(c_t(s)\big)$$

where δ is the depreciation rate of capital $V_{e,t}(s)$ defines expected utility discounted at a patient factor $\beta \in [0,1]$. As in Mendoza (1991) ϕ denotes a capital adjustment cost. Households weigh consumption goods according to $\alpha_s \in (0,1)$. The parameter that regulates the Frisch elasticity of labor supply is denoted σ_e and φ_e is a scaling factor that helps match hours worked observed in the data. The return on capital lent to firms is $r_t(s)$. The wage paid to workers in sector s is

$w_t(s)$. Consumption is denoted $c_t(s)$, $x_t(s)$ denotes gross investment, and $k_t(s)$ denotes physical capital lent to firms in sector s. r_t denotes the interest rate at which domestic residents can borrow from international markets in period t, and d_t is household debt.

We assume $r_t = r_w + \eta(\exp(D_t - D) - 1)$ where $r_w$is the world interest rate faced by domestic agents and is assumed to be constant, η and D are also constant parameters. $\eta(\exp(D_t - D) - 1)$ is the state specific interest rate premium that increases with the level of debt. The assumption of a debt elastic interest rate is taken from Schmitt-Grohé and Uribe (2003). D_t represents the aggregate level of debt.

τ_t^c is the tax on household consumption purchases. ζ is the share of consumption goods subject to the sales tax, $\tau_{e,t}^{i,s}$ is the individual income tax collected by the state. $\tau_{e,t}^{i,f}$ is the individual income tax collected by the federal government. Income tax rates depend on the individual earning ability. τ_t^k is a tax on fixed assets owned by households. τ_t^l is the share of income paid in licenses, fees and other revenue sources for the state government. $\tau_t^{corp}$is the corporate income tax faced by the owners of capital.

Individuals choose $\{c_{e,t}, x_{e,t}, l_{e,t}, k_{e,t}, d_{e,t}\}_{t=0}^{\infty}$ so as to maximize 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.

Firms

In each sector s, a large number of competitive firms produce goods according to the following production function:

$$y_t(s) = a_t(k_{t-1}(s))^{\theta_s} \left(\sum_e z_e \, l_{e,t}(s) \right)^{(1-\theta_s)}$$

These firms solve the following profit maximization problem:

$$\Pi_t = (1 - \tau_t^{cat}) a_t(k_{t-1}(s))^{\theta_s} \left(\sum_e z_e \, l_{e,t}(s) \right)^{(1-\theta_s)} - \sum_e w_{e,t}(s) l_{e,t}(s) - r_t(s) k_{t-1}(s)$$

where a_t is total factor productivity (TFP), θ is associated with the capital share of total output. z_e is labor productivity specific to a household member's earning ability. It is important to note that the demand for labor 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:

$$(1 - \tau_t^{cat})(1 - \theta_s) a_t(k_{t-1}(s))^{\theta_s} \left(\sum_e z_e \, l_{e,t}(s) \right)^{(-\theta_s)} z_e = w_{e,t}(s),$$

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

$$(1-\tau_t^{cat})a_t(k_{t-1}(s))^{\theta_s-1}\left(\sum_e z_e\, l_{e,t}\,(s)\right)^{(1-\theta_s)} = r_t(s),$$

We assume a_t follows a stationary mean zero autoregressive process of order 1 in the log. The shock innovation $\epsilon_{A,t}$ is drawn from a standard normal distribution.

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

The Government Sector

The government 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.

$$RF_t = T_t + FF_t - g_t$$

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

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

$$T_t = \sum_e^E \sum_s^S (\tau_t^{cat} y_t(s) + \tau_t^c \zeta c_t(s) + \tau_t^e \zeta c_t(s) + \tau_{e,t}^{i,s} w_t(s) l_t(s) + \tau_{e,t}^{i,s} r_t(s) k_{t-1}(s) + \tau_t^k k_{t-1}(s) + \tau_t^l y_t(s))$$

We can write the trade balance to GDP ratio (TB_t) as:

$$\mathrm{TB}_t = 1 - \frac{c_t + x_t + g_t}{y_t}$$

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, 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, to a first approximation, the deterministic steady-state coincides with the average position of the model economy. In turn, 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 exploited in the calibration of the model. Second, the deterministic steady-state is often used as a convenient point around which the equilibrium conditions of the stochastic economy are

approximated (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:

$$1 = \beta\left[(1 - \tau^{i,s} - \tau^{l} - \tau^{i,f} - \tau^{corp})r + 1 - \delta - \tau^{k}\right]$$

$$y = k^{\theta_s}\, l^{(1-\theta_s)}$$

$$\theta_s \left(\frac{k}{l}\right)^{\theta_s - 1} = r$$

These expressions deliver the steady-state capital-labor ratio, which we denote ω

$$\omega \equiv \frac{k}{l} = \left(\frac{\beta^{-1} - 1 + \delta + \tau^{k}}{\theta_s(1 - \tau^{i,s} - \tau^{l} - \tau^{i,f} - \tau^{corp})}\right)^{1/(\theta_s - 1)}$$

The steady-state level of capital is:

$$k = \omega l$$

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

$$c = y - \delta k - g - TB\, y$$

which implies: $y = c + x + g + TB\, y$

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

$$\varphi_e = \frac{\alpha_s}{(1 + \tau_t^{c} + \tau_t^{e})c_{e,t}(s)} \frac{(1 - \tau_{e,t}^{i,s} - \tau_t^{l} - \tau_{e,t}^{i,f})w_{e,t}(s)}{\left(1 + \frac{1}{\sigma_e}\right) l_{e,t}(s)^{\frac{1}{\sigma_e}}}$$

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.

The depreciation rate of capital δ and the world interest rate $i_{r,w}$ are based on parameter values widely used in the related business-cycle literature and on the average annual depreciation rate taken from the Bureau of Economic Analysis, $\delta = 0.1$ and $r_w = 0.04$.

The sector specific parameter θ_s is set to match the observed average labor shares for each of nine production sectors in Louisiana. 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.

The parameter D is set to match the observed average trade-balance to output ratio in Louisiana since $TB = i_{r,w}\, D/y$.

Table A-1: Baseline Calibration Louisiana

Variable	Value	Description	Restriction
$\tau^{i,s}\ AGI1$	0.007	State individual income tax rate	STC
$\tau^{i,f}\ AGI1$	0.031	Federal individual income tax rate	IRS-SOI
$\tau^{i,s}\ AGI2$	0.013	State individual income tax rate	STC
$\tau^{i,f}\ AGI2$	0.057	Federal individual income tax rate	IRS-SOI
$\tau^{i,s}\ AGI3$	0.026	State individual income tax rate	STC
$\tau^{i,f}\ AGI3$	0.117	Federal individual income tax rate	IRS-SOI
τ^{c}	0.04	General sales tax rate	STC
τ^{e}	0.028	Excise tax rate	STC
τ^{s}	0.035	Severance tax rate	STC
τ^{CAT}	0.003	CAT tax rate	ODT
τ^{Corp}	0.007	Corporate income tax rate	STC
τ^{k}	0.001	Franchise tax rate	STC
ζ	0.70	Share of Consumption Expenditures subject to sales tax	See appendix B
TR1/Y	0.04	State Tax Revenues	STC
τ^{l}	0.04	Other State collections	STC
FF/Y	0.04	Transfers from the federal government	STC
ϑ	0.023	Annual average growth rate of GDP	BEA
C/Y	0.56	Consumption to GDP ratio	BEA
X/Y	0.22	Investment to GDP ratio	BEA
G/Y	0.12	Government spending to GDP ratio	BEA
NX/Y	0.10	Net exports to GDP ratio	BEA

N	0.25	Hours worked/available hours (1975-2015)	CPS
χ	4.5	Disutility of labor	Set to match hours worked
r	0.04	Avg. annual real interest rate (1950-2015)	FRED
δ	0.10	Annual depreciation rate of capital	BEA
σ	0.4	Elasticity of Labor Supply	Reichling and Whalen (2012)

Note: BEA data represents long-run averages for 1963-2015.

Labor and capital income tax rates represent average marginal rates per income group for 2002-2014.

STC refers to "the US Census Bureau's Annual Survey of State Tax Collections."

ODT refers to "Ohio Department of Taxation."

Income tax rates represent effective tax rates for each AGI group

Sales tax rate represent the long-run average statutory rate for all consumption expenditures subject to the tax.

All other tax rates are long-run average effective tax rates for taxes paid to the state if not mentioned otherwise.

Table A-2: Earning Ability Specific Calibration Variables

Variable	Description	Value			Restriction
		e=1	e=2	e=3	
z_e	Labor productivity	1.000	3.734	14.029	IRS-SOI
$q^{h,e}$	Share of household members	0.643	0.246	0.111	IRS-SOI

Note: Values based on IRS-SOI data represent averages for 1996-2015.

Table A-3: Sector Specific Shares of Output and Employment

	Sector	Output Share	Employment Share
1	Agriculture, forestry, fishing, and hunting	α_1 =0.01	0.02
2	Mining	α_2 =0.10	0.03
3	Utilities, transportation, and warehousing	α_3 =0.07	0.05
4	Construction	α_4 =0.05	0.09
5	Manufacturing	α_5 =0.23	0.08
6	Trade	α_6 =0.13	0.17
7	Services	α_7 =0.23	0.40
8	Real estate and rental and leasing	α_8 =0.11	0.04
9	Health care and social assistance	α_9 =0.07	0.12

Note: Values represent averages for 1997-2015, calculations based on data from the BEA Regional Income Division.

Table A-4: Sector Specific Shares in Income

	Sector	Labor Share	Capital Share
1	Agriculture, forestry, fishing, and hunting	0.308	θ_1 =0.692
2	Mining	0.470	θ_2 =0.530
3	Utilities, transportation, and warehousing	0.643	θ_3 =0.357
4	Construction	0.580	θ_4 =0.420
5	Manufacturing	0.687	θ_5 =0.313
6	Trade	0.646	θ_6 =0.354
7	Services	0.607	θ_7 =0.393
8	Real estate and rental and leasing	0.531	θ_8 =0.469
9	Health care and social assistance	0.609	θ_9 =0.391

Note: Values represent averages for 1997-2015, calculations based on data from the BEA.

Table A-5: Summary of Tax Policy Scenarios

Scenario	Description	Effective Tax Rates	
		Baseline	**Scenario**
I	Elimination of General Sales Tax Exemptions	$\zeta = 0.7$	$\zeta = 1$
II	Elimination of Corporate Income Tax	$\tau^{CORP} = 0.007$	$\tau^{CORP} = 0.0$
III	Introducing Commercial Activity Tax (CAT)	$\tau^{CAT} = 0.0$	$\tau^{CAT} = 0.003$
IV	Elimination of Franchise Tax	$\tau^{k} = 0.001$	$\tau^{k} = 0.0$
V	Excluding Federal Deductions on State Corporate Income Tax	$\tau^{corp} = 0.007$	$\tau^{corp} = 0.008$
VI	Allow FY2016 1% sales tax increase to expire	$\tau^{c} = 0.05$	$\tau^{c} = 0.04$
VII	Repeal $180 million of sales tax exemptions	$\zeta = 0.7$	$\zeta = 0.746$
VIII	Extend sales tax to $200 million of services	$\zeta = 0.7$	$\zeta = 0.751$
IX	Reduce individual income tax credits by $193 million	$\tau^{i,s}AGI1 = 0.007$	$\tau^{i,s}AGI1 = 0.007$
		$\tau^{i,s}AGI2 = 0.013$	$\tau^{i,s}AGI2 = 0.014$
		$\tau^{i,s}AGI3 = 0.026$	$\tau^{i,s}AGI3 = 0.028$
X	Replace corporate income tax with revenue neutral commercial activity tax	$\tau^{cat} = 0$	$\tau^{cat} = 0.0033$
XI	Replace corporate income tax with revenue neutral repeal of sales tax exemptions	$\zeta = 0.7$	$\zeta = 0.785$
XII	Adopting aspects of Governor Edwards' proposal	$Baseline\ tax\ rates$	$scenarios$ 5,6,7,8,9

Note: The fact that our model assumes multiple AGI groups that face a group specific tax burden makes our model inputs consistent with marginal tax rates.

APPENDIX B: DATA SOURCES AND VARIABLE COMPUTATIONS

Macroeconomic Variables

All variables are reported in real (2009$) per capita terms using the US gross domestic product (GDP) deflator reported by the Bureau of Economic Analysis (BEA) and, if not declared otherwise, we refer to the period of 1963-2015. [1]

Gross Domestic Product
We calculate the real GDP per capita, which is the primary variable of economic output, by dividing the total real GDP at the state-level by the total state population (also available from the BEA Regional Economic Accounts – GDP by State). Our calculation of GDP does not include residential investments. Our GDP projections use the latest GDP values and apply the state's GDP long-run annual growth rate of 1.6% from 1990-2015.

Consumption
We use consumption data from the BEA Regional Economic Accounts – Personal Consumption Expenditures (PCE).[2] Consumption expenditures on durable goods are subtracted from total PCE in order to calculate our measure of consumption. 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.

Investment
Because the BEA does not report private fixed investment at the state level, we use the US share of non-residential investment in GDP from the BEA and multiply it by the state GDP in order to estimate Louisiana's 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 and therefore residential investment is excluded from GDP as well.

Trade Balance/Net Exports
We calculate the value of net exports as the trade balance by using the resource constraint of

$$GDP = C + X + G + TB$$

where G represents the total state, local, and federal government spending on the state level.

Capital Stock
Because the capital stock *K* is not reported by the BEA, we estimate it for Louisiana in 1963 by dividing investment by the sum of the average annual growth rate of GDP per capita and the average deprecation rate where the averages are for the period 1963-2015.

$$K_{1963} = \frac{X_{1963}}{\vartheta + \delta}$$

For the following years, we use the capital accumulation equation to estimate the capital stock.

$$K_t = X_{t-1} + K_{t-1}(1 - \delta)$$

Employment

We base our employment data for the number of non-farm jobs on data from the Bureau of Labor Statistics (BLS). We calculate the employment shares per sector using data from the BEA. We took the average weekly hours worked from the Annual Social and Economic Supplement (ASEC) of the Current Population Survey (CPS). The average weekly hours worked at all jobs are 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 its annual growth rate for 1990-2015 of 0.85%.

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 (2155 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 Congressional Budget Office's (CBO) definition (Harris and Mok, 2015).

Depreciation Rate

Because the BEA does not report depreciation data at the state level, we refer to data for the US economy. The depreciation rate on physical capital used in the present study is based on data from the BEA Fixed Assets Accounts.[3] 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.

Labor and Capital Share

In order 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.[4] 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.[5] The capital share is simply one minus the labor share. The values refer to the years 1998-2015.

Real Interest Rate

The real interest rate is the difference between the nominal interest rate and the inflation rate. We use the 3-Month Treasury Bill rate as the nominal interest rate and the GDP deflator described earlier as the inflation rate.[6]

$$r = i_{3MTB} - \pi$$

Earning Ability of Household Members

The earning ability for our model's three types of households is based on the Adjusted Gross Income (AGI) from the IRS Statistics of Income (IRS-SOI) tables.[7] Earning ability 1 has an AGI of up to $50,000 per year, earning ability 2 is from $50,000-$100,000, and earning ability 3 has an AGI of over $100,000 per year. The share of household members by earning ability, $q^{h,e}$, is the share of returns per earning ability group from the line *Taxable Income* in the IRS-SOI tables. The labor productivity per earning ability, z_e, is the taxable income per return for each earning ability with the labor productivity for group 1 being normalized to one.

Sectors

Our model uses 9 production sectors. The BEA reports GDP for each 2-digit *North American Industry Classification System (NAICS)* industries, which we use to calculate each sector's percentage in total GDP, see Table A-3. 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
1	Agriculture, forestry, fishing, and hunting	"Agriculture, forestry, fishing, and hunting"
2	Mining	"Mining"
3	Utilities, transportation, and warehousing	"Utilities" and "Transportation and Warehousing"
4	Construction	"Construction"
5	Manufacturing	"Manufacturing"
6	Trade	"Wholesale Trade" and "Retail Trade."
7	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"
8	Real estate, rental and leasing	"Real Estate and Rental and Leasing"
9	Health care and social assistance	"Health Care and Social Assistance"

Tax Rates

State Tax Revenues

The state tax revenues are obtained from the US Census Bureau's Annual Survey of State Tax Collections (STC)[8] if not stated otherwise. For the projections of the total state tax revenues in our scenarios, we use the latest share of total tax revenues in total GDP.

Effective State Individual Income Tax Rate

The effective tax rates on individual income for Louisiana are calculated by using the revenues from the state individual income tax and the distribution of adjusted gross income reported by the IRS.[9] We calculate effective tax rates for each of our three income groups. We apply the distribution of federal individual income tax liability to split-up the state individual income tax revenues on the income groups. By assuming multiple AGI groups that face a group specific tax burden, our model inputs are consistent with marginal tax rates and with the state aggregate income tax revenues as a share of GDP.

Effective Federal Individual Income Tax Rate

To calculate the federal individual income tax rates, we use the total tax liability of individual income taxes from the IRS-SOI[10] and AGI for each group.

General Sales and Excise Tax Rates

The tax revenues for Louisiana's general sales and excise taxes are obtained from the US Census Bureau's STC.[11] The excise tax is the sum of several taxes on consumption. The tax base for these tax rates is the share of total personal consumption expenditures subject to taxation from the BEA.

Effective Severance Tax Rate

According to the Louisiana Department of Revenue, the "severance tax is levied on production of natural resources taken from land or water bottoms within the territorial boundaries of the state."[12] For the effective tax rate, we use the GDP of the mining sector as the tax base.

Effective Corporate Income Tax Rate

The tax revenues for the corporate income tax rate are reported by the US Census Bureau's STC as "Corporate Net Income." To calculate the effective tax rate, we divide these revenues by the capital income, which is given by multiplying the GDP with the capital share in income, θ.

Other State Tax Collections

"Other taxes" include miscellaneous small taxes such as the property tax, license taxes, death and gift taxes, or other taxes not classified by the US Census Bureau. "Other taxes" also include revenues from the sale of property and services, gaming, various settlements, lottery revenues, and other revenue not classified by the US Census Bureau.

Commercial Activity Tax

To estimate the effects of implementing a Commercial Activity Tax (CAT) in Louisiana, we assume implementing the same system used in Ohio. Our model scenario applies the effective

tax rate on GDP, so we therefore use Ohio's GDP from the BEA as the tax base.13 The tax revenues of Ohio's CAT are taken from the Ohio Department of Taxation Annual Report.14 As the CAT has been phased in recently, we calculate the effective tax rate for 2015 rather than using long-run averages. The annual report of the Ohio Department of Taxation explains Ohio's CAT in more detail, but we have summarized the explanation in the following paragraph and Table B-2.

The CAT is an annual tax imposed on businesses in Ohio, and is measured by gross receipts from business activities in the state. Businesses with Ohio taxable gross receipts of $150,000 or more per calendar year must register for the CAT, file applicable tax returns, and make all corresponding payments. The tax has limited exclusions for certain types of businesses, such as financial institutions, insurance companies, and some public utilities, if those businesses pay other specific Ohio taxes. Examples of receipts not subject to the CAT include: interest (other than from installment sales); dividends; capital gains; wages reported on a W-2; or gifts. In general, for the sale of property, such receipt is only considered a taxable gross receipt if the property is delivered to a location in Ohio.

Table B-2: Summary of Ohio's Commercial Activity Tax

Taxed Entities	Persons/Service Providers or Businesses with more than $150,000 in gross receipts.
Taxed Transactions	Sales, Services, Rentals, or Leases
Minimum Amounts	**Tax Bracket**
$150	$150,000 - $1,000,000
$800	$1-$2 million
$2,100	$2-$4 million
$2,600	Over $4 million
Rates	**Tax Bracket**
No Tax	Under $150,000
minimum amount from previous year	$150,000 - $1,000,000
minimum amount, plus a rate of 0.26% for Gross Receipts over $1,000,000 minus the minimum payment	Over $1,000,000
Exemptions	Non-Profits, Financial Institutions, Insurance Companies, Public Utilities, Motor Fuels

Source: Ohio Department of Taxation, Annual Report 2015.

Endnotes

[1] Bureau of Economic Analysis, Table 1.1.4., NIPA Tables. We use the annual price index of GDP as GDP deflator.
[2] Bureau of Economic Analysis, Personal Consumption Expenditures (PCE) by State, Regional Economic Accounts.
[3] Bureau of Economic Analysis, Table 1.3. and 1.5., Fixed Assets Accounts.
[4] Bureau of Economic Analysis, Table SA6N, Regional Economic Accounts.
[5] Bureau of Economic Analysis, Table SA5N, Regional Economic Accounts.
[6] Federal Reserve Bank of St. Louis, 3-Month Treasury Bill: Secondary Market Rate, https://fred.stlouisfed.org/series/TB3MS
[7] IRS, Statistics of Income, SOI Tax Stats, Historic Table 2, https://www.irs.gov/uac/soi-tax-stats-historic-table-2
[8] Individual income tax revenues, US Census Bureau, Annual Survey of State Tax Collections, http://www2.census.gov/govs/statetax/stcfy16.zip
[9] IRS, Statistics of Income, SOI Tax Stats, Historic Table 2, https://www.irs.gov/uac/soi-tax-stats-historic-table-2
[10] IRS, Statistics of Income, SOI Tax Stats, Historic Table 2, https://www.irs.gov/uac/soi-tax-stats-historic-table-2
[11] US Census Bureau, Annual Survey of State Tax Collections, http://www2.census.gov/govs/statetax/stcfy16.zip. See definition of excise tax under "Selective Sales and Gross Receipt Taxes" in the contained pdf-file "Tax Revenue Classifications".
[12] Louisiana Department of Revenue, www.dnr.louisiana.gov/.../severance/la_severance_tax_rates.pdf
[13] Bureau of Economic Analysis, Table gsp_naics_OH, Regional Economic Accounts.
[14] Ohio Department of Taxation, Annual Report 2015, p. 38-43, http://www.tax.ohio.gov/Portals/0/communications/publications/annual_reports/2015_Annual_Report/2015_AR.pdf

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Addressing Louisiana's Budget Shortfall: Strategies for Growth
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