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Modeling Georgia Fundamental Tax Reform Using REMI

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Introduction

Considerable interest in fundamental tax reform exists in Georgia. Fundamental tax reform is a broad concept, but in this paper it refers to a large and broad tax change that reduces income taxation and increases taxes on consumption. Fundamental tax reform was studied by Governor Sonny Perdue's blue ribbon tax commission in 2010. More recently, during the 2015 Georgia legislative session, several bills were introduced including the *More Take Home Pay Act*, which would have lowered state income tax rates, raised the sales tax rate and broadened the sales tax base. Often such proposals are intended to be revenue neutral such that the decrease in revenue from the reduction in income taxation is offset by an increase in revenue from the change in taxes on consumption.

The benefits attributed to this kind of fundamental tax reform are grounded in basic economic theory. The current income tax structure generally taxes wages and capital income, including interest and dividends. By shifting to a tax on consumption, typically a sales tax, in the short-run, the net economic return from work and savings increases relative to consumption, which in turn should create incentives for additional savings as well as work effort (labor supply). The additional savings are available to the economy and can lower capital costs, making it easier for firms to expand. In the short to medium term, the increase in labor supply also allows firms to add employees at relatively lower wages than prior to the policy change, which is also conducive to firm growth. At the same time, the tax on consumption will cause a decline in demand for goods and services, which has its own feedback loop, sending a signal to producers to produce less and employ fewer workers, which creates a countervailing drag on the economy.

The bet policymakers are making with fundamental tax reform is that the lower cost of capital and the additional labor available to the economy will promote greater economic growth, which will overcome the drag on the economy created by higher priced goods and services due to the increased consumption tax. This result has been supported by analysts using sophisticated computable general equilibrium (CGE) models at the national level (see Altig et al. 2001), as well as recently at the state level in Georgia (see Condon et al. 2015). In this report, we examine the effects of fundamental tax reform on the Georgia economy using a model from Regional Economic Models, Inc. (REMI). Using the REMI model of Georgia allows us to examine the effects of tax reform on different sectors of the state's economy.¹

The REMI model includes some of the important features of CGE models while providing greater industry-level detail; however, its output may not be directly comparable to CGE models for reasons noted below. REMI is a proprietary model that is available for lease and is widely used at the state level for estimating the economic impact of a variety of policy changes, including tax policy (Bluestone and Bourdeaux 2015).

In brief, the REMI model of Georgia is run using two different assumptions about the effect that fundamental tax reform would have on the cost of capital in Georgia. Under the first specification, the cost of capital is reduced as a result of the increased savings available to the Georgia economy. In this specification, the Georgia economy resembles a closed economy in that the additional savings of

¹ The transition from a personal income tax to a consumption tax at the state level could pose problems for Georgia, including the timing of tax receipts and issues in administration. In this analysis, these potential issues are assumed to have no material effect on state revenues. For a detailed discussion of these issues at the federal level, see Gravelle (2008).

residents remains in the state, which would reduce the cost of capital in Georgia.² In the second specification, the fundamental tax reform has no effect on the cost of capital in Georgia because the state is treated as an open economy in which the cost of capital is determined nationally. Under this assumption, increased savings associated with Georgia's tax reform is not enough to reduce the national cost of capital. We find that the results from the REMI model depend on the impact that tax reform is assumed to have on the cost of capital.³

The remainder of the report is organized as follows. The second section briefly examines the economic theory behind fundamental tax reform. The third section discusses the REMI model and how replacing personal income tax with a consumption tax is modeled. The fourth section discusses the REMI model results of the simulated tax reform in Georgia. The fifth section examines how changes in relative prices of goods and services affect consumption and other relevant economic variables in the REMI model. The sixth section concludes.

Fundamental Tax Reform Theory

The theory supporting fundamental tax reform, in which the personal income tax is replaced with a tax on consumption, is grounded in the notions of economic efficiency and the impact of incentives.⁴ An economy can become more efficient, in the sense of producing more output per capita, if reform eliminates tax-related distortions in decisions to work, save and invest. Reducing income tax rates can incentivize the productive activities of working, saving and investing.

Consumption-based tax reform uses this logic to suggest that a shift from an income tax to a consumption tax can achieve the goals of increased economic efficiency and create incentives to save and invest. The relationship among savings, income and consumption shown below helps to illustrate the reasoning (Garner 2005):

$$\text{Savings} = \text{Labor earnings} + \text{Current capital income} - \text{Consumption}$$

The current income tax structure generally taxes labor earnings and current capital income (realized gains) but makes no allowance for savings.⁵ A tax on consumption rewards savings by deferring taxation until the savings are spent on consumption.

In a study using a sophisticated model of the U.S. economy, Altig et al. (2001) test the economic theory of fundamental tax reform by replacing the individual and corporate income tax with a consumption tax,

² For this analysis, the cost of capital is the interest rate charged to borrow money for business investment. However, the additional savings of individuals due to the elimination of the income tax could also be used for business investment.

³ These results differ markedly from those of Condon et al. (2015). This report discusses some of the REMI model assumptions and specifications that help explain the REMI results. Both the REMI model and the Condon et al. CGE model are very complex. It is beyond the scope of this study to conduct the very technical analyses necessary to more fully compare the REMI model with the CGE model used by Condon et al. or to show how the different model structures could lead to the different outcomes.

⁴ The personal income tax is usually the focus of this theory and is the focus of our discussion. The corporate income tax also produces distortions in firm behavior but, due to corporate structures, is more difficult to model. In addition, the corporate income tax produces much less revenue than the personal income tax.

⁵ There are exceptions, such as savings in an IRA or 401K account.

while keeping total revenue constant.⁶ They find that fundamental tax reform can improve long-run output. However, the change to a consumption tax from an income tax produces winners and losers. In particular, elderly holders of capital (savings) bear a larger burden due to the tax shift. Generally, the elderly do not have much labor income, so they do not benefit from the elimination of income taxes. However, the elderly are generally living off of their savings, which typically comes from income earned when they were younger. These savings were thus already taxed as earned income. These savings would be taxed again at a higher rate as the elderly spend it down on living expenses. When changes to the consumption tax are made to relieve some of the burden on the elderly, many of the long-run improvements to output diminish (Altig et al. 2001). For a more thorough review of fundamental tax reform theory and efforts to model it at the federal level, see Garner (2005).

Condon et al. (2015) develop a CGE model of Georgia and its surrounding states. They model several Georgia tax reform scenarios, including a revenue-neutral shift to an expanded sales tax base and the elimination of personal income tax (the authors' reform option "B") that is comparable to the reform modeled herein. They find that replacing the Georgia personal income tax with an expanded sales tax increases the 10-year compound growth rate of personal income by roughly 0.67 percentage points over a 3.37 percentage point baseline growth rate annually. The result is driven by a "beggar thy neighbor" effect, as capital flows into Georgia from neighboring states when the net rate of return to capital increases in Georgia due to the income tax decrease. These neighboring states then experience slower personal income growth from their baseline.

REMI Model Assumptions

ABOUT THE MODEL

For the simulation of fundamental tax reform, we use a single-region REMI PI+ model of Georgia.⁷ The REMI model uses input-output matrices, CGE techniques and econometric models to attempt to capture all of the effects of a tax policy change, including dynamic effects that change the underlying economic forecast. (For a more thorough discussion of these concepts, see Bluestone and Bourdeaux (2015).) Like standard input-output models, REMI has interindustry linkages and can determine direct, indirect and induced effects caused by tax changes. The REMI model determines new wages and prices endogenously, unlike the standard input-output model, which takes the supply of labor, materials and capital as infinite at current wages and prices. (Wages and prices do not change in the standard input-output model.)

The REMI model includes elements of a CGE model such as modeling behavioral responses to economic changes. For instance, when a new firm locates in a region, the demand for labor increases, bidding up wages. Conversely, higher wages cause workers to migrate into the region, increasing the supply of labor, which tends to reduce wages, though not to their initial equilibrium value. The net effect on wages depends on industry-specific factors, such as the industry wage rate, worker productivity, the rate of in- or out-migration of labor, and time. REMI, like CGE models, goes through a similar process in

⁶ Altig et al. (2001) use a CGE model of the whole U.S. economy and federal tax system. A basic discussion of CGE models is included later in this section.

⁷ REMI offers tax PI, which is a customizable model of a given region's tax structure. We did not use that model for our analyses due to cost considerations. In addition, we deemed it unnecessary to test the implications of fundamental tax reform as the result is revenue neutral. For additional details on REMI's various models, see the company's website at www.remi.com.

determining adjustments for the other factors of production including capital until a new equilibrium is reached.⁸ This new equilibrium is used to estimate the tax revenue generated by the new policy.

The REMI model is one of several nationally accepted models that take dynamic effects into account when analyzing policy changes. In short, dynamic models incorporate the tax policy change into a new macroeconomic forecast of the region of interest. The REMI model differs from traditional CGE models in the assumptions used regarding the degree of capital and labor mobility. In addition, REMI differs from traditional CGE models in that it relies on historical data and econometrics to estimate the response of labor and capital to changes in policy. (For a more comprehensive discussion of REMI and other dynamic models, see Bluestone and Bourdeaux (2015).)

MODELING GEORGIA

Georgia's current sales tax base consists primarily of retail goods and mostly does not include services. These categories of consumer expenditures, provided in Appendix A, were identified in the REMI model in the regional control baseline, which lists the aggregate amount consumed in each category in Georgia.⁹ For instance, the REMI model estimates that Georgians spent \$1.26 billion on household appliances in 2013. Summing all the consumer expenditure categories for which sales tax currently is charged in Georgia generates a current sales tax base of \$95.7 billion.¹⁰

Fundamental tax reform aims to apply a broad-based tax on consumption in place of a tax on income. In REMI, this is accomplished by adding the remaining currently untaxed consumer expenditures to the tax base. Taxing these items results in a comprehensive sales tax base of \$272.9 billion. Included in the new sales tax base is the imputed rental value of owner-occupied housing as well as health care expenditures. (See Appendix A for a list of included items.) No state has accomplished taxing such an expansive array of consumable goods and services.

A revenue-neutral reform would need to raise an additional \$8.75 billion from the sales tax to make up for the lost income tax revenue using fiscal year (FY) 2013 figures. The total sales tax revenue is therefore \$14.07 billion under the fundamental reform. (This includes the baseline \$5.32 billion in sales tax revenue in FY 2013 plus the lost income tax revenue.) To generate \$14.07 billion in sales tax from the base of \$272.87 billion, a sales tax rate of 5.2 percent is applied.

Condon et al. (2015) use a sales tax that only is applied to final consumption.¹¹ The benefit of this approach, similar to a value added tax (VAT), is that it produces fewer distortions to the economy, as business inputs are not subject to the tax. We use this same convention in our simulation.

Georgia's current tax structure does not resemble a VAT in that some business inputs are subject to sales tax. To transform the current Georgia sales tax to a tax on final consumption, sales tax on business inputs must be removed from the model. To accomplish this, the cost of business inputs is reduced by the estimated amount of the 2013 sales tax collected on business inputs. Georgia collected

⁸ This process is referred to as an endogenous adjustment process. Most CGE models also have an endogenous adjustment process for the cost of capital. REMI does not. This is discussed in greater detail in the next section.

⁹ Regional control is the status quo baseline forecast generated by REMI and is what any change in policy is compared to. In this report, the region is the state of Georgia.

¹⁰ This is similar to the estimated implied sales tax base of \$133.1 billion for 2013, as determined by the Georgia Department of Revenue sales collections, discussed in greater detail below.

¹¹ In the model, this tax is applied to consumer purchases of all goods and services, including health care and owner-occupied housing.

\$5.32 billion in sales tax in FY 2013; given the state's 4 percent sales tax rate in 2013, this implies a sales tax base of \$133.1 billion. The REMI sales tax base of \$95.71 billion is derived from U.S. Bureau of Economic Analysis personal consumption data, which does not include firms. Thus, the additional \$37.40 billion in the Georgia sales tax base is assumed to be the amount of purchases by firms to which the tax is applied.¹² This amounts to \$1.50 billion in sales tax collections on business inputs.

Table I. Modeling Changes to Georgia Sales Tax Rate and Base (in billions \$)

	BUSINESS TO:		
	TOTAL	CONSUMER	BUSINESS
EXISTING SALES TAX BASE (ESTIMATED USING REMI)			
Collections new sales tax rate (5.2%) applied to old base	\$4.94	\$4.94	\$0.00
Current amount of sales tax collected (4%)	\$5.32	\$3.83	\$1.50
Adjustment to old base entered into REMI		\$1.11	-\$1.50
NEW SALES TAX BASE ESTIMATED USING REMI			
Adjusted additional sales tax due to new base	\$9.14	\$9.14	\$0.00
Adjustment to new items in base entered into REMI		\$9.14	\$0.00

Source: Georgia DOR, REMI PI+ and author's calculations

The new sales tax rate of 5.2 percent is applied to the existing sales tax base of \$95.7 billion and the amount of the newly expanded sales tax base of \$177.2 billion. (Two of the largest additions to the new sales tax base are housing and health care.) This application of the new rate results in a total adjusted amount of sales tax collected on the old business-to-consumer tax base of \$4.94 billion (5.2 percent of \$95.7 billion). The newly expanded tax base adds another \$9.14 billion in sales tax collections (5.2 percent of \$177.2 billion). As Georgia collected \$3.83 billion in FY 2013 in sales tax from the existing business-to-consumer sales tax base, only \$1.11 billion is added to this base in the model (\$4.94 billion minus \$3.83 billion, see Table I). Due to the new sales tax base and the new sales tax rates, \$10.25 billion is added to sales tax collections in the REMI model (\$1.11 billion plus \$9.14 billion). Finally, the \$1.50 billion collected under the current sales tax from business-to-business transactions is credited to firms in the form of reduced production costs in the REMI model (see Table I).¹³ The net result is that sales taxes in the REMI model have increased by \$8.75 billion to offset the elimination of the personal income tax.

Two additional adjustments to the REMI model must also be made to more accurately reflect Georgia's economic and fiscal conditions after fundamental tax reform. Generally, data sources on wages and income are reported based on place of work. Thus, workers who live outside of Georgia but are employed within the state would have their incomes incorporated into the model but their spending would not be included because it predominantly occurs outside of Georgia. To account for this potential mismatch in state income and spending, REMI makes a residence adjustment to personal income in a

¹² It has been estimated that up to 40 percent of the sales tax is borne by firms (Ring 1999; Cline et al. 2004). The amount of sales tax paid by firms estimated here corresponds to roughly 28 percent of the sales tax base and is in the range estimated in the literature.

¹³ In Georgia, almost all manufacturing inputs are exempt from sales tax, including energy. Thus, manufacturing-sector production costs are not changed in REMI. The reduction in production costs to those remaining firms are allocated by firm size, as measured by output.

region based on commuting patterns and assumptions on the residence of the income recipients. To make this adjustment, REMI relies on an equation that includes the consumer price index in the region and other relevant commuting variables but does not make any adjustments for personal taxes. Thus, in our model in which prices rise to simulate the increase in the consumption tax and personal taxes fall to simulate the elimination of personal income taxes, only the rise in prices is considered for the residence adjustment equation. In this case, the REMI model estimates that the change in prices will cause workers to move out of Georgia and into the neighboring states, and the model makes no offsetting adjustment for the equal increase in income due to the personal tax decrease. The REMI model values this change in residence-adjusted income leaving Georgia at \$922 million greater than the baseline estimate in 2015, growing to \$968 million by 2024.

To correct for this gap in the REMI model, the amount of the personal tax decrease is augmented by the amount of the residence adjustment. Therefore, in 2015, the amount entered for the personal tax decrease is \$9.67 billion (\$8.75 billion in offsetting sales tax increase plus \$922 million, the residence adjustment amount). A similar adjustment is made to each succeeding year through 2024.

The second adjustment necessary is to the cost of capital in the REMI model. One of fundamental tax reform's links to economic growth is its expected effect on capital costs. In many national-level CGE models, total investment is determined by the amount of savings in the national economy. In these national CGE models, the economy is assumed to be closed. If Georgia were a closed economy, there could be no flow in or out of savings. Thus, the interest rate in the state would be expected to adjust so that the amount of savings available would be sold at a market-clearing interest rate.

However, in a regional model of a U.S. state, savings and investment can be expected to flow in and out of the state. Consequently, increased Georgia savings may not have the same effect on regional investment or the interest rate within the state as predicted if Georgia was a closed economy. As Georgia is part of the larger U.S. economy, it is highly possible that investment opportunities outside the state could cause savings to leak out of the state and into the larger national economy. In addition, investment from outside the state could flow into Georgia to take advantage of regional investment opportunities. These cross-border flows of savings and investment would generally mute the internal link between available savings generated in the state and the interest rate. Thus, the amount of additional savings available to the Georgia economy due to the tax reform could have a range of effects on the cost of capital in the state when an open economy is assumed.

REMI does not have an endogenous capital cost response to increased savings. However, the cost of capital can be adjusted in the model. To account for the potential reductions in the cost of capital in Georgia due to the increased incentives for savings and investment stemming from the tax reform, we adjust the cost of capital. The adjustment is guided by the results in Altig et al. (2001).¹⁴ The tax reform reduces income taxes by \$8.75 billion. Using Altig et al.'s implied marginal savings rate of roughly 6 percent yields increased Georgia savings of \$512 million. We then assume that this additional savings would reduce the cost of capital by 0.7 percent (70 basis points) based on the changes in interest rates estimated by Altig et al. (2001) using similar policies. (This change is due to the standard closed

¹⁴ When Altig et al. (2001) modeled a shift from a tax on income to a consumption tax, the savings rate increased from 5.1 percent to 6.7 percent over 14 years and the interest rate decreased from 8.3 percent to 7.6 percent, a change of 70 basis points. As discussed earlier, there are differences in the assumptions used when modeling a closed national economy, like Altig et al. did, and the regional open economy we model here. In an effort to be in keeping with the literature, we adopt similar values of both the savings rate and the change in the cost of capital.

economy result in which the supply of capital increases and the price decreases in order to reach a new economic equilibrium.) To compensate for this in the model, consumption is reduced by \$512 million. This represents the “savings” generated by the revenue-neutral policy change that is available to lower the cost of capital in Georgia. Note that the \$512 million is about 0.6 percent of private investment in 2015, so the effect is small relative to overall investment. Recall that in an open regional economy, changes in the interest rate are not tied directly to regional savings. Thus, the 0.7 percent change in the cost of capital is likely to be the upper bound. It is possible that the change in the cost of capital could be less than 0.7 percent and perhaps zero. To test the effect of this range of changes in the cost of capital attributable to fundamental tax reform, we run the model with the cost of capital adjustment of 0.7 percent and without, simulating no change to the cost of capital from the tax reform.

Results from REMI

Economic theory suggests that if taxes on consumption are increased while taxes on income are reduced, there should be an increase in the incentives for favorable economic activity, such as savings, investment and increased labor supply. These changes should have positive effects on the economy, all else equal. Condon et al. (2015) find a positive effect when examining fundamental tax reform in Georgia. When we run a similar model using REMI, our results are mixed. Even in instances when fundamental tax reform has positive effects on the Georgia economy, the changes are relatively modest. In our specification with no adjustments to the cost of capital, fundamental tax reform does not improve economic output over the baseline forecast. The following section discusses these results. The comparison in most cases is relative to REMI’s baseline forecast, unless otherwise specified.

The REMI results vary depending on how the model is specified. In the specification in which the cost of capital declines, employment and gross state product (GSP) grow modestly over the baseline. In the model specification in which the cost of capital does not change, employment and GSP decline modestly relative to the baseline (for the baseline forecast, see the Appendix). Table 2 shows the results of the REMI model with the increased sales tax rate of 5.2 percent and a base that includes all consumer expenditures and a 0.7 percent (70 basis point) reduction in the cost of capital. Table 3 shows the results of the same REMI model as in Table 2 but without the cost of capital adjustment. Note that the model specifications are revenue neutral, with the consumption tax (formerly the sales tax) increasing to cover the elimination of the \$8.75 billion personal income tax collections in FY 2013.

Tables 2 and 3 display four years of results — 2015, 2016, 2020 and 2024 — to illustrate how the variables of interest change over time. These results over time demonstrate that the effects of the reform are not “smooth” or constantly increasing or decreasing. Feedback effects take time, and different impacts (e.g., labor migration vs. capital investment) can happen at different times. For example, in Table 2 employment decreases by 0.17 percent in 2015 and by 0.11 percent in 2016. By 2020, changes in employment become positive, with an increase of 0.05 percent in 2020 and 0.08 percent in 2024. GSP has similar results: it is estimated to decrease by 0.15 percent in 2015 but then to increase over time. By 2024, GSP is expected to be greater than the baseline estimate, with an increase of 0.18 percent (see Table 2).

Table 2. REMI Results of Fundamental Tax Reform in Georgia with Capital Adjustment

CATEGORY	2015	2016	2020	2024	AVG. PERCENT CHANGE
Total Employment	-0.17%	-0.11%	0.05%	0.08%	0.004%
Private Non-Farm Employment	-0.18%	-0.12%	0.06%	0.08%	0.008%
Population	-0.16%	-0.28%	-0.53%	-0.61%	-0.5%
Personal Income	-0.41%	-0.40%	-0.28%	-0.22%	-0.3%
Disposable Personal Income	2.22%	2.08%	1.77%	1.53%	1.8%
Real Disposable Personal Income	-0.67%	-0.65%	-0.55%	-0.49%	-0.5%
PCE-Price Index	2.91%	2.75%	2.34%	2.04%	2.4%
Gross State Product	-0.15%	-0.09%	0.11%	0.18%	0.06%

Source: REMI PI+ and author's calculations

Note: All figures in the above table represent changes from the REMI baseline forecast for Georgia.

Assuming that the cost of capital decreases, disposable personal income, which is defined as after-tax income, increases by 2.22 percent in 2015 and by 1.53 percent in 2024. This increase in disposable personal income is the immediate result of the reduction in personal income tax. However, real disposable personal income in Georgia, which is adjusted for the price index (PCE), declines modestly, with a decrease of 0.67 percent from the baseline in 2015 and 0.49 percent by 2024 (see Table 2).¹⁵ The PCE price index increases by 2.91 percent in 2015 and by 2.04 percent in 2024, reflecting the higher consumption tax rate and broader base in Georgia relative to the rest of the country under the tax reform.

Table 3. REMI Results of Fundamental Tax Reform in Georgia without Capital Adjustment

CATEGORY	2015	2016	2020	2024	AVG. PERCENT CHANGE
Total Employment	-0.37%	-0.38%	-0.27%	-0.22%	-0.3%
Private Non-Farm Employment	-0.40%	-0.40%	-0.27%	-0.22%	-0.3%
Population	-0.21%	-0.38%	-0.77%	-0.94%	-0.7%
Personal Income	-0.55%	-0.59%	-0.54%	-0.47%	-0.5%
Disposable Personal Income	2.09%	1.90%	1.52%	1.28%	1.6%
Real Disposable Personal Income	-1.00%	-1.02%	-0.97%	-0.92%	-1.0%
PCE-Price Index	3.11%	2.94%	2.52%	2.22%	2.6%
Gross State Product	-0.34%	-0.34%	-0.24%	-0.18%	-0.3%

Source: REMI PI+ and author's calculations

Note: All figures in the above table represent changes from the REMI baseline forecast for Georgia.

Table 3 shows the results of the REMI model specification that assumes the tax reform does not change the cost of capital in Georgia ("open economy" assumption). Without the change in the cost of capital,

¹⁵ The additional consumption tax is modeled in REMI as a price increase rather than a personal tax increase. This allows for industries that previously had no sales tax to raise prices more than those industries that historically had sales tax applied. The difference in relative prices across industries has implications for consumption and is examined later.

the REMI model finds only slight declines in employment, real disposable personal income and GSP, which generally moderate over time. For instance, total employment and GSP decrease by 0.37 percent and 0.34 percent, respectively, in 2015, while real disposable personal income decreases by 1.0 percent. By 2020, total employment and GSP are estimated to underperform the baseline by 0.27 percent and 0.24 percent, respectively. Real disposable personal income is estimated to drop below the baseline by 0.97 percent by 2020. By 2024, total employment, GSP and real disposable personal income are all still estimated to be below the baseline by 0.22 percent, 0.18 percent and 0.92 percent, respectively.

LABOR FORCE PARTICIPATION

One of the ways in which fundamental tax reform can boost economic performance is through greater incentives for saving, investing and returns to work, which can all lead to greater labor supply as economic output expands. Increased labor supply can come from residents and/or from in-migrants.

Based on the REMI estimates, fundamental tax reform will not have the expected positive impact on labor supply. This result flows from the equations that REMI uses to determine economic migration and labor force participation. These equations combine several elements, such as the relative employment opportunity in the area and the relative real compensation rate in the area. Note that the relative real compensation rate is adjusted for the price level in the area. Because prices go up with the tax reform, real wage increases associated with reduced income taxes will be tempered by higher prices. In the model specification that includes a change to the cost of capital, labor force participation is always lower after fundamental tax reform than the baseline projection. The changes are relatively small. For instance, labor force participation rates decrease by 0.29 percent in 2015 and by 0.60 percent in 2024 (see Table 4). This result may be partially due to the substitution of now cheaper capital for labor. Without the adjustment to the cost of capital, labor force participation rates decrease by 0.39 percent in 2015 and by 1.0 percent in 2024 (see Table 4). Note that during this period, labor force participation is declining in Georgia even under the REMI baseline projection, from 63 percent in 2015 to 60 percent by 2024.

Table 4. Labor Force Participation Rate Percent Change

MODEL SPECIFICATION	2015	2016	2020	2024	AVG. PERCENT CHANGE
Participation Rate w/ Capital Cost Adjustment	-0.29%	-0.44%	-0.61%	-0.60%	-0.55%
Participation Rate w/o Capital Cost Adjustment	-0.39%	-0.61%	-0.95%	-1.00%	-0.84%

Source: REMI PI+ and author's calculations

Note: All figures in the above table represent changes from the REMI baseline forecast for Georgia.

MIGRATION

Economic theory also predicts that fundamental tax reform will induce positive migration into the region as workers seek to benefit from the perceived higher after-tax wages due to the shift away from income taxation. Neither model specification has beneficial effects on economic migration in REMI. Again this impact is the result of the price level increase relative to the nominal wage increase as well as the limited expansion in employment opportunities, which is linked to the demand for capital.¹⁶

Table 5. Economic Migration Change

MODEL SPECIFICATION	2015	2016	2020	2024
Migration w/ Capital Cost Adjustment	-16,130	-11,774	-3,407	-890
Migration w/o Capital Cost Adjustment	-21,124	-16,416	-6,233	-2,171

Source: REMI PI+

Note: All figures in the above table represent changes from the REMI baseline forecast for Georgia.

In 2015, net economic migrants to Georgia decrease by 16,310 below the baseline projection. However, the negative effects of fundamental tax reform diminish over time, and by 2024, net economic migration is estimated to be only about 890 people below the baseline. This is a small share of the labor force: in 2015, the decrease in migrants represents about 0.32 percent of the labor force, declining to 0.02 percent by 2024. In the specification that does not include adjustments to the cost of capital, the economic migration declines are somewhat larger but of a similar magnitude (see Table 5).

SAVINGS AND INVESTMENT

As was discussed earlier, state and federal income taxes make few allowances for savings.¹⁷ A theoretical benefit of fundamental tax reform is that taxing consumption increases the incentive to save, as income generated from saving and investing is no longer taxed. This additional savings and investment fueled by increased availability of capital can be infused into the economy in the form of additional capital and can spur economic growth. Recall that REMI has no endogenous capital cost response but does allow the researcher to make adjustments to the cost of capital.¹⁸ We next examine how the investment sector responds to fundamental tax reform in the REMI model.

¹⁶ Economic migrants are people under age 65 who respond to economic and amenity factors. If the value is negative, then more people are moving out of a region than moving in. This measure does not include military personnel.

¹⁷ The income generated from investing savings is taxed as interest income or as a capital gain upon realization. The income tax system allows preferential treatment for retirement saving.

¹⁸ The REMI model does not include the federal deductibility of state income taxes either.

Table 6. Investment Changes in Percent

CATEGORY	2015	2016	2020	2024	AVG. PERCENT CHANGE
CHANGE IN INVESTMENT W/ CAPITAL COST ADJUSTMENT					
Residential	-1.99%	-2.48%	-1.43%	-0.71%	-1.58%
Nonresidential	1.39%	2.08%	2.48%	2.15%	2.25%
Equipment and Intellectual Property Products	0.18%	0.29%	0.58%	0.78%	0.53%
CHANGE IN INVESTMENT W/O CAPITAL COST ADJUSTMENT					
Residential	-2.94%	-3.80%	-2.58%	-1.47%	-2.68%
Nonresidential	-0.17%	-0.15%	0.14%	0.30%	0.08%
Equipment and Intellectual Property Products	-0.02%	-0.04%	-0.03%	0.01%	-0.02%

Source: REMI PI+ and author's calculations

Note: All figures in the above table represent changes from the REMI baseline forecast for Georgia.

In REMI, investment is divided into three categories: business equipment and intellectual property products (equipment), residential and nonresidential. Table 6 shows that how investment responds to fundamental tax reform in the REMI model varies by type of investment. As expected, when we use the specification that does not adjust for the cost of capital, the magnitude of the positive responses diminishes.

Equipment is the largest investment category, representing 60 percent of total investment in 2015, and is the least responsive to fundamental tax reform. When the cost of capital is reduced, investment in equipment increases by 0.18 percent in 2015. This amount steadily increases over time, and by 2024 it is 0.78 percent above the baseline. In 2024, this corresponds to an increase in investment in equipment from the baseline of \$615 million.¹⁹ Without a reduction in the cost of capital in the region, equipment investment declines in the early years, decreasing by 0.02 percent in 2015, and essentially reaches the baseline amount by 2024.

Residential investment makes up the second-largest category, accounting for roughly 22 percent of total investment in 2015.²⁰ In both specifications, residential investment declines, most likely due to the higher cost of housing from the imposition of the consumption tax. With the cost of capital adjustment, the decline in residential investment is smaller. For instance, with the cost of capital adjustment, in 2015 residential investment is estimated to decline by 1.99 percent, representing a drop of \$389 million. Without the cost of capital adjustment, residential investment declines by 2.94 percent, representing a decline of \$574 million in 2015. The decline in residential investment diminishes over time in both specifications, and by 2024 it is below the baseline by 0.71 percent with the cost of capital adjustment and 1.47 percent below without it (see Table 6).

¹⁹ The REMI model results can be shown as a percentage change from the baseline forecast or as a dollar amount. The dollar amount is referred to as a change in levels. All amounts in levels are in fixed 2014 dollars unless otherwise noted.

²⁰ Residential investment is defined as the purchase of residential structures by individuals and private business.

Nonresidential investment accounts for roughly 18 percent of total investment in 2015.²¹ It has the largest positive response to fundamental tax reform in both specifications. This is partially attributable to business costs being reduced due to the new consumption/sales tax structure. For instance, in 2015, nonresidential investment is estimated to increase by 1.39 percent over the baseline with the cost of capital adjustment, increasing to 2.15 percent by 2024. In levels, adjusting for the cost of capital, nonresidential investment increases by \$204 million in 2015 relative to the baseline and by \$414 million by 2024. In the specification without the cost of capital adjustment, the growth in nonresidential investment fluctuates. It declines by 0.17 percent in 2015 but gradually increases to 0.30 percent above the baseline by 2024 (see Table 6).

Prices and Consumer Expenditure Changes

As was discussed earlier, the REMI model estimates that fundamental tax reform in Georgia would have a limited impact on jobs, real disposable personal income and GSP. This is partially because in REMI labor supply and investment are fairly nonresponsive to fundamental tax reform, even when adjusting the cost of capital. This lack of response is partially because the model incorporates relative real compensation, which includes adjustments for the price level in the region in the labor supply function. For investment, the REMI model is partially constrained by the assumption of a Cobb-Douglas production function, which limits the amount of capital that can be substituted for labor. This section examines the link in REMI between changes in consumer prices and consumption as well as how these changes affect other important economic variables such as employment and net exports.

Table 7 shows the specification with and without the cost of capital adjustment. REMI divides consumer expenditures into 13 broad categories. Table 7 lists them in order of consumer expenditure amounts. Health care, housing and food for off-premise consumption (groceries) account for about 37.3 percent of total consumption in 2015 and 36.7 percent in 2024. The changes in prices for health care, housing and groceries are some of the largest percentage price increases, as these items were not taxed previously.²²

²¹ Nonresidential investment is defined as the purchase of nonresidential structures and equipment by private business and by nonprofit institutions.

²² These price changes are primarily demand driven, as the changes in consumption are similar across specifications, with the exception of housing, which is more strongly linked to the cost of capital.

Table 7. Price Changes of Consumption Goods in Percent

	-----2015-----		-----2024-----		2015 SHARE OF TOTAL SPENDING
	W/K* ADJUSTMENT	NO K ADJUSTMENT	W/K ADJUSTMENT	NO K ADJUSTMENT	
Recreation and Other Services	2.3%	2.4%	1.6%	1.7%	28.2%
Health Care	4.6%	4.7%	3.3%	3.4%	16.4%
Housing	4.7%	5.1%	3.2%	3.6%	13.5%
Other Nondurable Goods	0.6%	0.8%	0.3%	0.5%	9.8%
Food and Beverages Purchased for Off-premises Consumption	4.0%	4.2%	2.8%	3.0%	7.4%
Recreational Goods and Vehicles and Other Durable Goods	0.8%	0.9%	0.4%	0.6%	6.3%
Motor Vehicles and Parts	4.0%	4.2%	2.9%	3.0%	3.9%
Household Utilities	0.5%	0.7%	0.2%	0.4%	3.3%
Clothing and Footwear	0.6%	0.7%	0.3%	0.5%	3.2%
Furnishings and Durable Household Equipment	0.7%	0.9%	0.4%	0.6%	3.1%
Motor Vehicle Fuels, Lubricants, and Fluids	3.7%	3.8%	2.6%	2.7%	2.6%
Transportation Services	4.6%	4.8%	3.3%	3.5%	2.3%
Fuel Oil and Other Fuels	0.3%	0.5%	0.2%	0.3%	0.1%

*K denotes capital cost adjustment

Source: REMI PI+ and author's calculations

Note: All figures in the above table represent changes from the REMI baseline forecast for Georgia.

Generally, the different specifications produce similar changes in the prices of goods and services with the exception of housing. As was shown earlier, residential investment is somewhat responsive to changes in the cost of capital. Thus, by reducing the cost of capital, housing investment declines by a smaller amount than might be expected given the increase in sales tax rates, which mitigates the rise in housing prices. Table 7 shows that the cost of housing is estimated to increase by 4.7 percent in 2015 over the baseline with the cost of capital adjustment and by 5.1 percent without the adjustment. By 2024, the cost of housing is estimated to increase by 3.2 percent over the baseline with the cost of capital adjustment and by 3.6 percent without. The changes to health care and grocery prices are very similar in the two specifications; thus, we only examine the specification with the adjustment to the cost of capital. In 2015, health care expenditures increase by 4.6 percent and groceries expenditures increase

by 4.0 percent over the baseline amounts. In 2024, health care and groceries are estimated to increase in price by 3.3 percent and 2.8 percent, respectively, over the baseline.

CONSUMPTION OF GOODS AND SERVICES

In the REMI model, fundamental tax reform generally has a negative impact on total consumption in Georgia. The rise in consumer prices stemming from the increase in the consumption tax in the model surpasses the benefits of increased disposable income due to the elimination of the personal income tax. In addition, the economy shifts away from housing, health care, and services and toward recreational goods and nondurable goods due to relative price effects, and this shift has adverse effects on the mix and number of jobs in Georgia. Table 8 illustrates how the changes in prices discussed earlier effect consumption levels for the relevant categories of goods and services in Georgia. Table 9 illustrates how these changes in consumption interact with industry domestic trade share and impact employment in the relevant sectors in Georgia.

Table 8. Changes in Consumer Expenditures*

	-----2015-----		-----2024-----	
	W/K** ADJUSTMENT	NO K ADJUSTMENT	W/K ADJUSTMENT	NO K ADJUSTMENT
Health Care	-\$1.21	-\$1.32	-\$1.16	-\$1.36
Housing	-\$0.71	-\$0.85	-\$0.70	-\$0.95
Recreation and Other Services	-\$0.53	-\$0.81	-\$0.46	-\$0.88
Motor Vehicles and Parts	-\$0.35	-\$0.40	-\$0.30	-\$0.37
Food and Beverages Purchased for Off-Premises Consumption	-\$0.29	-\$0.34	-\$0.30	-\$0.40
Motor Vehicle Fuels, Lubricants, and Fluids	-\$0.12	-\$0.14	-\$0.14	-\$0.19
Transportation Services	-\$0.12	-\$0.13	-\$0.12	-\$0.15
Fuel Oil and Other Fuels	\$0.00	\$0.00	\$0.00	\$0.00
Clothing and Footwear	\$0.09	\$0.08	\$0.05	\$0.00
Household Utilities	\$0.10	\$0.09	\$0.06	\$0.02
Furnishings and Durable Household Equipment	\$0.18	\$0.13	\$0.24	\$0.18
Recreational Goods and Vehicles and Other Durable Goods	\$0.36	\$0.26	\$0.58	\$0.45
Other Nondurable Goods	<u>\$0.52</u>	<u>\$0.41</u>	<u>\$0.57</u>	<u>\$0.43</u>
Summary	-\$2.08	-\$3.03	-\$1.67	-\$3.22

*Billions of Fixed (2014) Dollars

**K denotes capital cost adjustment

Source: REMI PI+

Note: All figures in the above table represent changes from the REMI baseline forecast for Georgia.

Table 8 shows the change in the amount of goods and services consumed in each model specification for 2015 and 2024. When the model adjusts the cost of capital, consumption in 2015 and 2024 is generally higher than in the specification without the adjustment. In 2015, consumer spending is estimated to

decrease by \$2.1 billion over the baseline versus \$3.02 billion without the cost of capital adjustment.²³ In 2024, consumer spending is estimated to be \$1.67 billion below the baseline with the cost of capital adjustment, and \$3.22 billion below the baseline-spending amount in the specification without the adjustment. The greatest declines in consumption are generally associated with services like housing and health care whose prices increased the most when the consumption tax was imposed. At the same time, we see offsetting increases in consumption for goods like nondurable goods that are in the current tax base and thus would become relatively less expensive when the tax reform takes effect.

Table 8 illustrates these findings, showing consumption changes from the baseline in billions of 2014 dollars for the specification with and without the capital cost adjustment. The implications of the tax reform are very similar for both specifications. For ease of exposition, we discuss the results from the specification with the cost of capital adjustment. Generally, the categories with the largest declines in consumption are those that the model estimates would have the largest increases in price; not surprisingly, the categories with the largest increases are those that the model estimates would have relatively lower prices after the fundamental tax reform takes effect. The three consumption categories of health care, housing and food for home consumption (groceries) all have relatively large percentage price increases and are estimated to experience declines in consumption totaling \$2.27 billion in 2015. Health care consumption is estimated to have the largest decline, \$1.21 billion, in 2015. By 2024, the consumption of housing, health care and groceries is estimated to decline by \$2.15 billion in total, compared to the baseline.

Goods with lower relative price increases, such as the two categories of “other nondurable goods” and “recreational goods and vehicles and other durable goods,” are estimated to have relatively small price increases along with increases in consumption in 2015 totaling \$870 million.²⁴ By 2024, these same two categories are estimated to have expenditures of \$1.14 billion in total over the baseline.

DOMESTIC TRADE SHARE IMPACT ON JOBS

The price changes shown in Table 7 and the consumption changes shown in Table 8 have disparate impacts on the Georgia economy due to the differences in domestic trade shares. In REMI, the domestic trade share is the amount of industry-specific consumer demand satisfied by firms within the region. For instance, the construction industry has a domestic trade share of about 86 percent, meaning that roughly 86 percent of consumer demand in the construction sector is satisfied by Georgia firms. This has implications for employment in other industries throughout the state, as consumption that remains in Georgia is more likely to be spent on other goods and services within the state.

²³ Recall that \$512 million in decreased consumption is due to the adjustment made earlier to account for the additional savings in Georgia brought on by the tax change.

²⁴ These goods were taxed previously and do not receive additional benefit from lower production costs because manufacturing inputs in Georgia are exempt from sales tax. “Recreational goods and vehicles and other durable goods” includes sporting equipment, supplies, guns and ammunition; sports and recreational vehicles; musical instruments; jewelry and watches; therapeutic appliances and equipment; books, educational and recreational; luggage and similar personal items; and telephone and facsimile equipment. “Other nondurable goods” includes pharmaceutical and other medical products; recreational items; household supplies; personal care products; tobacco; magazines, newspapers and stationery; and net expenditures abroad by U.S. residents.

Health care, housing and food for home consumption (groceries) would sustain some of the largest price increases due to the increased consumption tax rate and broader base, and these types of consumption tend to be associated with industry sectors that have high domestic trade shares. As consumption in these areas falls, the impact of that decreased consumption will be felt most heavily by Georgia firms in the form of declines in revenue from the baseline projections. The categories of goods for which consumption expenditures increase are those that have lower domestic trade shares, such as other nondurable goods. As consumption of these goods increases, many of the benefits of that increased consumption will be garnered by firms outside of Georgia.

This shift in consumer spending from items and industries that have high domestic trade shares to industries with lower domestic trade shares can affect the mix of employment and GSP in Georgia. Declining revenue in the industries associated with health care, housing and groceries filters through the model and can change employment and GSP relative to the baseline (see the Appendix B for model linkages). This results in a change in the types of jobs from the baseline projections. Table 9 illustrates how changes in some categories of consumption affect other categories by showing the relevant top industry sectors for job gains and losses in the model.

Fundamental tax reform, as modeled in REMI, generally improves job creation in industry sectors associated with consumption categories estimated to have relatively small price increases. For example, nondurable goods and the industry sector of retail trade have modest price increases and are not hard hit in terms of employment and output. Moreover, the model shows that fundamental tax reform has detrimental effects on job creation in industry sectors that are associated with consumption categories that have relatively large price increases, such as the consumption category of health care and industry sector of ambulatory care (essentially all doctor's office visits that do not occur in a hospital setting).

Table 9 shows the changes from the baseline scenario in the number of jobs in various industry sectors that are associated with the consumption categories previously discussed. The table includes the 2015 baseline numbers of jobs as well as the rank in number of jobs of the 66 private nonfarm sectors in the Georgia REMI model.²⁵ The sectors are sorted by the estimated change in jobs in 2015 that would result from the fundamental tax reform. Table 9 contains four of the top five sectors in employment for Georgia.²⁶ The eight sectors in Table 9 account for 58 percent of all job gains and losses.

²⁵ Note that the REMI model of Georgia used here is a 70-sector model. The remaining four sectors are farm and federal, state and local government.

²⁶ Administrative and support services, which is ranked second, is not included.

Table 9. Changes in Sector Jobs

	-----2015-----		-----2024-----		-----2015-----	
	W/K* ADJUSTMENT	NO K ADJUSTMENT	W/K ADJUSTMENT	NO K ADJUSTMENT	NUMBER OF JOBS	RANK
Retail Trade	2,514	822	3,671	1,471	569,131	1
Food Services and Drinking Places	2,376	1,800	1,745	476	371,124	4
Social Assistance	1,112	998	672	388	99,979	12
Professional, Scientific, and Technical Services	-312	-851	1,009	-250	376,072	3
Securities, Commodity Contracts, Investments	-458	-675	524	158	86,181	16
Hospitals	-811	-860	-662	-837	146,783	9
Construction	-1,362	-3,969	647	-2,719	299,218	5
Ambulatory Health Care Services	-5,035	-5,792	-3,648	-4,423	229,657	8

*K denotes capital cost adjustment

Source: REMI PI+ and author's calculations

Note: All figures in the above table represent changes from the REMI baseline forecast for Georgia.

Table 9 lists the results from the specification with and without the capital cost adjustment. In the specification without capital cost adjustments, the magnitude of job gains in the relevant sectors is smaller than in the specification with the capital cost adjustment. In industry sectors that are estimated to experience job losses, the losses are generally smaller when using the capital cost-adjusted specification. For ease of exposition, we focus on this specification, but the results of the specification with no capital cost adjustment are similar.

Growth in jobs is primarily concentrated in retail trade, which is the largest employment sector in the state and which benefits the most from fundamental tax reform, adding 2,514 jobs in 2015 and 3,671 by 2024. Note that retail trade encompasses some 569,000 jobs in 2015; thus, the percentage of growth is modest, roughly 0.4 percent, and is a similar 0.6 percent in 2024. The relative price of most retail trade does not increase markedly because that sector was subject to the pre-reform sales tax. Other sectors that are estimated to have a greater number of jobs in 2015 than the baseline forecast are food service and drinking places, with 2,376 jobs, and social assistance, with 1,112 jobs. Growth in these sectors slows by 2024. Food service and drinking places gains 2,590 jobs, and social assistance gains 990 jobs in 2024.²⁷

²⁷ Social assistance includes child care workers; child, family and school social workers; personal and home care aides; social and community service managers; and social and human service assistants. Note that child care workers and personal and home care aides account for 77 percent of national employment by occupation in this sector.

Job growth in the construction sector is sensitive to the assumptions made regarding the cost of capital. As was discussed earlier, residential investment is sensitive to changes in the cost of capital, and the construction sector job estimates reflect this link. In addition, the tax reform causes the cost of housing to increase. In the specification with the capital cost adjustment, in 2015, construction sector employment declines by 1,362 jobs relative to the baseline. The construction sector experiences modest growth over time, and by 2024 it has added 647 jobs over the baseline. In the specification with no capital cost adjustment, job losses in the construction sector relative to the baseline in 2015 are 3,969 and in 2024 are 2,719.

Employment in the service sectors declines due to the relative increase in consumer prices associated with taxing a previously (largely) untaxed sector. Health care is a distinct case. Two sectors are associated with health care in Table 9: ambulatory health care services, which is estimated to have a decline of 5,035 jobs relative to the baseline, and hospitals, which would lose 811 jobs in 2015. Job losses would continue in these sectors, and by 2024, ambulatory health care services is estimated to have lost 3,648 jobs and hospitals 662 jobs.

Table 9 also shows a modest shift in the mix of employment in various sectors due to fundamental tax reform. The health care sectors lose jobs, while the retail trade and food services and drinking places sectors hire more workers. Generally, jobs lost in the health care sectors have higher average wages than those gained in the sectors of retail trade and food services and drinking places (Bluestone 2014). In 2015, retail trade and food services and drinking places will add an estimated 4,890 jobs over the baseline forecast, and ambulatory health care services and hospitals will have an estimated decline of 5,846 jobs. By 2024, retail trade and food services and drinking places are estimated to have 5,416 more jobs than the baseline forecast, while ambulatory health care services and hospitals are expected to have a decline of 4,310 jobs from the baseline estimate.

NET EXPORTS

Net exports contribute to state GSP. Growth in net state exports typically leads to growth in GSP. Fundamental tax reform in Georgia, as specified in the REMI model, increases the amount of net exports in both model specifications. Table 10 illustrates the changes in net exports in levels.²⁸ In the specification with the cost of capital adjustment, net exports increase by \$1.31 billion in 2015 and by \$1.86 billion by 2024. The increase in net exports in the early years is due to a decline in imports, but in the later years it is primarily due to an increase in total exports. Decreasing the cost of capital could also help grow exports. In the model specification without the cost of capital adjustment, net exports increase as well, but this increase is largely due to the declining value of imports.²⁹ The increase in exports in both specifications is likely attributable to the decline in production costs due to the shift to a VAT-style consumption tax under which business inputs are not subject to the tax. Declines in imports are likely due to the decline in real disposable personal income, the effect of which is muted somewhat by the reduction in the cost of capital.

²⁸ REMI does not calculate net exports. However, it does estimate the amount of exports and imports, which allows us to calculate net exports, defined as exports minus imports.

²⁹ Only personal consumption expenditures are taxed; thus, exports would not be taxed.

Table 10. Exports, Imports, and Net Exports Changes (Millions 2014 \$)

	2015	2016	2020	2024
COST OF CAPITAL ADJUSTMENT				
Exports of Goods and Services	\$478	\$761	\$1,441	\$1,704
Imports of Goods and Services	-\$827	-\$763	-\$379	-\$154
Net Exports	\$1,305	\$1,524	\$1,820	\$1,858
NO COST OF CAPITAL ADJUSTMENT				
Exports of Goods and Services	\$352	\$515	\$895	\$984
Imports of Goods and Services	-\$1,546	-\$1,722	-\$1,711	-\$1,589
Net Exports	\$1,898	\$2,237	\$2,606	\$2,573

Source: REMI PI+ and author's calculations

Note: All figures in the above table represent changes from the REMI baseline forecast for Georgia.

Conclusion

To summarize the results of fundamental tax reform using the REMI model, Table 11 shows the compound average yearly growth rates (growth rates) for total employment, real GSP, real disposable personal income and population from 2014 to 2024. REMI has fairly conservative baseline growth rate projections for Georgia, with a real GSP yearly growth rate of 1.27 percent and a real disposable personal income yearly growth rate of 2.44 percent.

Table 11. Compound Annual Growth Rates 2014-24

	FUNDAMENTAL TAX REFORM		BASELINE FORECAST
	W/K* ADJUSTMENT	NO K ADJUSTMENT	
Total Employment	0.67%	0.64%	0.66%
Gross Domestic Product	1.28%	1.25%	1.27%
Real Disposable Personal Income	2.35%	2.41%	2.44%
Population	0.61%	0.58%	0.66%

*K denotes capital cost adjustment

Source: REMI PI+ and author's calculations

Note: All figures in the above table represent changes from the REMI baseline forecast for Georgia.

Fundamental tax reform has a small effect on the growth rate, compared to the baseline forecast, but this varies if the cost of capital is adjusted. When the cost of capital is adjusted, the yearly growth rate for total employment increases to 0.67 percent from the baseline of 0.66 percent annual growth from 2014 to 2024. This modest improvement to employment is linked to a decline in production costs combined with decreases in the cost of capital. Together, these changes add to employment despite declines in consumption. When the cost of capital is unchanged, the impact on employment becomes slightly negative, with the annual growth rate declining by 0.02 percentage points.

The growth rate for real GSP increases by 0.01 percent from a baseline of 1.27 percent from 2014 to 2024. Net exports increase in both specifications. However, in the specification with the adjustment to the cost of capital, consumption falls by a smaller amount but does not offset the other areas of growth

in the components of GSP such as net exports and private investment. When the cost of capital remains unchanged, consumption falls by a greater amount and private investment also declines. These two factors are enough to outweigh the increase in net exports.

The modest gains in employment and GSP do not lead to growth in real disposable personal income or population over the baseline forecast. Real disposable personal income has a yearly growth rate of 2.35 percent in the specification with the adjustment for the cost of capital, compared to 2.44 percent for the baseline from 2014 to 2024. This seems to indicate that the model weights the changes to regional prices more strongly than it does the changes to regional personal income, despite the adjustment to make them offset. From 2014 to 2024, population also declines slightly relative to the baseline, with a growth rate of 0.61 percent versus 0.66 percent for the baseline.

Without the cost of capital adjustment, the growth rate for the variables shown in Table 11 all decline slightly from the baseline. The decline in employment and GSP highlight the model's sensitivity to the value of the cost of capital. In REMI, the shift from income tax to a VAT-style consumption tax must also induce a reduction in the cost of capital to have positive effects on GSP and employment. The size of the reduction in the cost of capital affects the model results.³⁰

Some of the results generated by REMI might be due to the model not being ideally suited to analyze this type of tax reform. REMI does not have an endogenous cost of capital function that is linked to changing consumer behavior. In addition, the adjustment necessary to correct for REMI's treatment of changing prices versus changing incomes in its residence adjustment equation may also create distortions in the model output; in other words, there may continue to be a mismatch between the state that income is earned in and the state in which it is spent.

The REMI model focuses on the role that fundamental tax reform has on relative prices across consumer goods and how those changes may impact consumer decision making. The results of fundamental tax reform in Georgia using the REMI model suggest several areas where additional research is needed to better understand the regional implications of a shift from a personal income tax to a consumption tax. Does fundamental tax reform change the regional consumption bundle, and if so, how will this affect regional employment and output? How does fundamental tax reform affect regional competitiveness in terms of the cost of capital, the cost of intermediate inputs and the cost of finished goods and services? Answers to these questions would help policy makers better understand the tradeoffs implicit in fundamental tax reform in which a consumption tax is substituted for a personal income tax.

³⁰ Various values for the change to the cost of capital were run through the model. To generate consistently positive results in all years, the reduction in the cost of capital needs to be greater than 100 basis points.

References

- Altig, David, Alan J. Auerbach, Laurence J. Kotlikoff, Kent A. Smetters and Jan Walliser. 2001. Simulating fundamental tax reform in the United States. *American Economic Review* 91(3): 574-595.
- Bluestone, Peter. 2014. *Jobs in Georgia's urban and rural regions, changes in distribution, type, and quality of jobs in Georgia counties from 2000-2012*. Center for State and Local Finance, 4.
- Bluestone, Peter and Carolyn Bourdeaux. 2015. *Dynamic revenue analysis: Experience of the states*. Center for State and Local Finance, 12.
- Condon, Jeffrey, Andrew Feltenstein, Florenz Plassmann, Mark Rider and David L Sjoquist. 2015. A regional model of growth-oriented fiscal policy: An application to Georgia and its competitor states. *Review of Regional Studies* 44(2).
- Cline, Robert, William Fox, Tom Neubig, and Andrew Phillips. 2004. Total state and local business taxes: A 50-state study of the taxes paid by business in FY 2003. In *Quantitative Economics and Statistics*, Ernst & Young LLP.
- Garner, C. Alan. 2005. Consumption taxes: Macroeconomic effects and policy issues. *Economic Review: Federal Reserve Bank of Kansas City* 90(2): 5.
- Gravelle, Jane G. 2008. *The flat tax, value-added tax, and national retail sales tax: Overview of the issues*. Congressional Research Service, Government and Finance Division.
- Regional Economic Models, Inc. 2015. REMI PI+ Model Equations 2015.
- Ring, R. J. 1999. Consumers' share and producers' share of the general sales tax. *National Tax Journal* 52: 79-90.

Appendices

Appendix A - Georgia Sales Tax Base Status of REMI Consumer Expenditure Categories

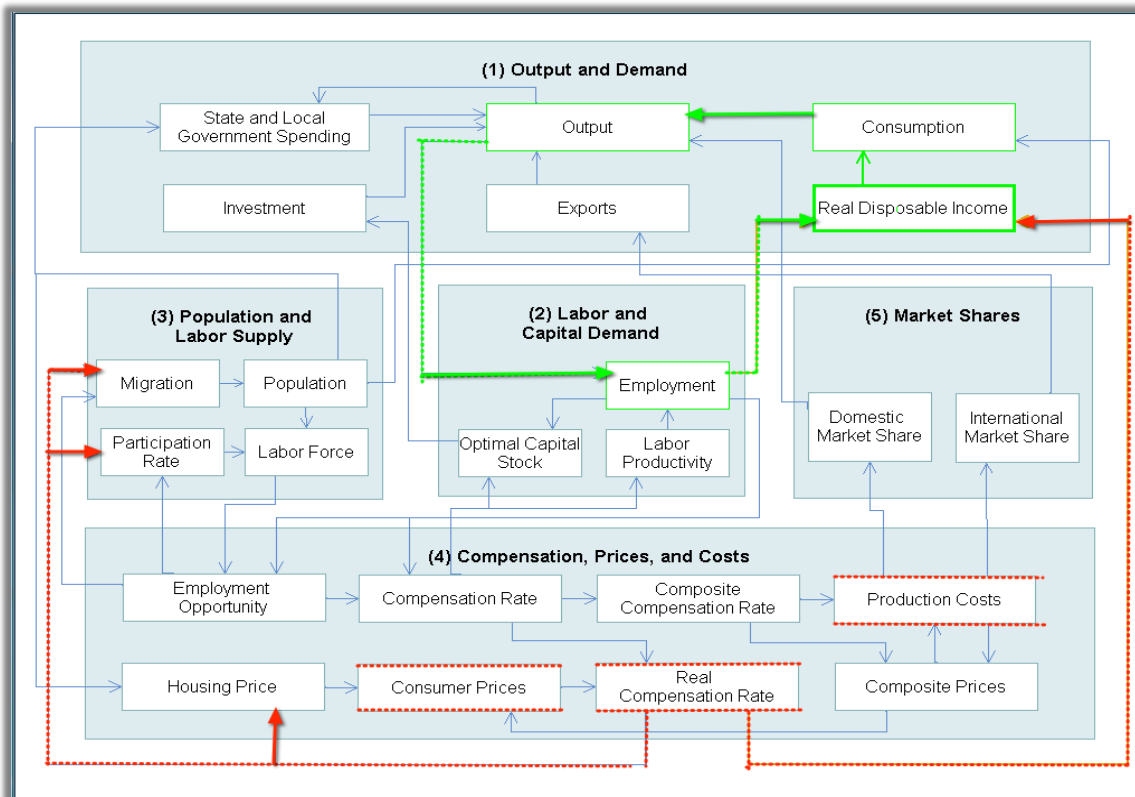
CATEGORY	DESCRIPTION
No Sales Tax	Net expenditures abroad by U.S. residents
No Sales Tax	Financial services furnished without payment
No Sales Tax	Postal and delivery services
No Sales Tax	Foreign travel by U.S. residents
No Sales Tax	Expenditures in the United States by nonresidents
Current Sales Tax Base	Motor vehicle parts and accessories
Current Sales Tax Base	Furniture and furnishings
Current Sales Tax Base	Household appliances
Current Sales Tax Base	Glassware, tableware, and household utensils
Current Sales Tax Base	Tools and equipment for house and garden
Current Sales Tax Base	Video, audio, photographic, and information processing equipment and media
Current Sales Tax Base	Sporting equipment, supplies, guns, and ammunition
Current Sales Tax Base	Sports and recreational vehicles
Current Sales Tax Base	Musical instruments
Current Sales Tax Base	Jewelry and watches
Current Sales Tax Base	Therapeutic appliances and equipment
Current Sales Tax Base	Books, educational and recreational
Current Sales Tax Base	Luggage and similar personal items
Current Sales Tax Base	Telephone and facsimile equipment
Current Sales Tax Base	Alcoholic beverages purchased for off-premises consumption
Current Sales Tax Base	Men's and boys' clothing
Current Sales Tax Base	Women's and girls' clothing
Current Sales Tax Base	Children's and infants' clothing
Current Sales Tax Base	Other clothing materials and footwear
Current Sales Tax Base	Fuel oil and other fuels
Current Sales Tax Base	Pharmaceutical and other medical products
Current Sales Tax Base	Recreational items
Current Sales Tax Base	Household supplies
Current Sales Tax Base	Personal care products
Current Sales Tax Base	Tobacco
Current Sales Tax Base	Magazines, newspapers, and stationery
Current Sales Tax Base	Water supply and sanitation
Current Sales Tax Base	Electricity
Current Sales Tax Base	Natural gas
Current Sales Tax Base	Purchased meals and beverages
Current Sales Tax Base	Accommodations

CATEGORY	DESCRIPTION
Current Sales Tax Base	Telecommunication services
New to Sales Tax Base	New motor vehicles
New to Sales Tax Base	Net purchases of used motor vehicles
New to Sales Tax Base	Food and nonalcoholic beverages purchased for off-premises consumption
New to Sales Tax Base	Food produced and consumed on farms
New to Sales Tax Base	Motor vehicle fuels, lubricants, and fluids
New to Sales Tax Base	Rental of tenant-occupied nonfarm housing
New to Sales Tax Base	Imputed rental of owner-occupied nonfarm housing
New to Sales Tax Base	Rental value of farm dwellings
New to Sales Tax Base	Group housing
New to Sales Tax Base	Physician services
New to Sales Tax Base	Dental services
New to Sales Tax Base	Paramedical services
New to Sales Tax Base	Hospitals
New to Sales Tax Base	Nursing homes
New to Sales Tax Base	Motor vehicle maintenance and repair
New to Sales Tax Base	Other motor vehicle services
New to Sales Tax Base	Ground transportation
New to Sales Tax Base	Air transportation
New to Sales Tax Base	Water transportation
New to Sales Tax Base	Membership clubs, sports centers, parks, theaters, and museums
New to Sales Tax Base	Audio-video, photographic, and information processing equipment services
New to Sales Tax Base	Gambling
New to Sales Tax Base	Other recreational services
New to Sales Tax Base	Food furnished to employees
New to Sales Tax Base	Financial service charges, fees, and commissions
New to Sales Tax Base	Life insurance
New to Sales Tax Base	Net household insurance
New to Sales Tax Base	Net health insurance
New to Sales Tax Base	Net motor vehicle and other transportation insurance
New to Sales Tax Base	Internet access
New to Sales Tax Base	Higher education
New to Sales Tax Base	Nursery, elementary, and secondary schools
New to Sales Tax Base	Commercial and vocational schools
New to Sales Tax Base	Professional and other services
New to Sales Tax Base	Personal care and clothing services
New to Sales Tax Base	Social services and religious activities
New to Sales Tax Base	Household maintenance
New to Sales Tax Base	Final consumption expenditures of nonprofit institutions serving households

Source: REMI PI+ and author's calculations

Appendix B – REMI Model Layout

Source: REMI PI+ Model Equations 2015 and author's additions



About the Author



PETER BLUESTONE is a senior research associate with the Fiscal Research Center and Center for State and Local Finance. His research includes urban economics, static and dynamic economic impact modeling, and state and local fiscal policy. His work includes modeling state and local impacts of policy changes and economic development using various economic models, including IMPLAN and Regional Economics Models Incorporated (REMI). Bluestone currently serves on the technical advisory committee for the Atlanta Regional Commission. He received his doctorate in economics from Georgia State University.

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