STAMP is an Unsound Tool for Gauging the Economic Impact of Taxes

Institute on Taxation and Economic Policy

May 2014

1616 P Street, NW Suite 200 • Washington, DC 20036
202.299.1066 • www.itep.org

CONTENTS

EXECUTIVE SUMMARY

- The Beacon Hill Institute (BHI), a free-market think tank located at Suffolk University, frequently uses its State Tax Analysis Modeling Program (STAMP) to perform analyses purporting to show that lowering taxes, or not raising them, will benefit state economies. But STAMP suffers from a number of serious methodological problems and should not be relied upon by anybody seeking to understand the economic impacts of state tax policies.

- As a "computable general equilibrium" (CGE) model, STAMP is grounded in a concept of perfect economic efficiency that bears little resemblance to reality. Moreover, the thousands of linkages between economic sectors built into STAMP are in many cases not well-studied and not subject to statistical testing.

- STAMP's unrealistic depiction of the public sector causes it to conclude that public investments like education and infrastructure are of relatively little value to state economies in both the short- and long-term. Government is modeled as a simplistic "pass-through" device that distributes tax dollars to households and discourages them from working in the process. This construction fits neatly with BHI's stated mission to promote "limited government," but it has also caused STAMP to produce estimates far out of line with more mainstream economic models.

- BHI studies typically devote little if any attention to the impact of tax changes on government employees. In those few cases where BHI has published sufficient data to allow for an assessment of STAMP's modeling of public sector employment, the results have been extremely inconsistent. STAMP has concluded that a $1 million cut (or increase) will result in the firing (or hiring) of anywhere from 1 to 37 government employees. This huge degree of variation raises questions about the model's robustness.

- BHI has built into STAMP an assumption that high-income workers are extremely sensitive to changes in income tax rates, and that those workers are far more sensitive than their lower-income neighbors to such changes. Both of these assumptions conflict with the findings of the nonpartisan Congressional Budget Office (CBO) and other experts.

- STAMP assumes that businesses' choice between hiring additional employees versus purchasing more machinery is heavily influenced by tax policy. Again, the degree of sensitivity to taxes assumed in STAMP is out of line with the best available estimates.

- STAMP also assumes that consumers will quickly and dramatically shift their consumption toward out-of-state goods and services if prices in their own state rise as a result of a tax increase. This assumption is very loosely based on a pair of studies published over two decades ago that relied on national and international economic data. It ignores newer, state-level data that indicate a substantially lower level of responsiveness. BHI also assumes that consumers in different industries behave very similarly to one another, despite evidence in the literature (including the studies cited by BHI) that indicate this is not the case.

- STAMP is incapable of estimating how a tax change will affect a state's economy in the time period immediately following its enactment. The way in which BHI presents its results often gives the impression that the economic impact will be instantaneous, which makes tax cuts, for example, appear less costly than they actually are in the short-term. This has also allowed BHI to mask the fact that some tax plans they believe would be economically beneficial are guaranteed to shrink the economy in the short-term.

- STAMP's methodological shortcomings are reflected in its unreliable results. STAMP's findings have been contradicted by academic researchers, state revenue offices, and the actual track record of states that have followed BHI's recommended low-tax path.

INTRODUCTION

In recent years, the Beacon Hill Institute (BHI) has used its State Tax Analysis Modeling Program (STAMP) to argue that state economies could be improved by cutting income taxes (in Kansas, Louisiana, Maine, Massachusetts, North Carolina, and Virginia), property taxes (North Dakota), sales taxes (Rhode Island), and estate taxes (North Carolina). STAMP has also been used to argue against increases in sales taxes (Arizona, Massachusetts, Michigan, and North Carolina), income taxes (Massachusetts and Washington), cigarette taxes (Massachusetts and South Carolina), gasoline taxes (Massachusetts), and even taxes on plastic shopping bags (District of Columbia). But while BHI routinely makes very specific claims about the job gains or losses associated with particular policies, it also concedes that its "economic modeling is as much art as science" (Haughton et al., 2003). Unfortunately for anybody interested in the true economic impact of state taxes, a careful examination of BHI's methodology reveals that its artistic vision has greatly distorted its analyses.

AN "EFFICIENT" SIMPLIFICATION

STAMP is a type of "computable general equilibrium" (CGE) model. CGE model builders attempt to approximate the workings of an economy by gathering data on different economic sectors (roughly 80 sectors in the case of STAMP) and then linking those sectors together through mathematical relationships. The user then "shocks" the economy by introducing some policy change into the model, and examines how that change reverberates throughout the model economy.

At their core, CGE models are limited by the fact that they can only calculate the economic effects that policy changes would have if they were enacted in a perfectly efficient marketplace that is capable of reaching a stable equilibrium (Johnson, 2013 and Ackerman et al., 2013). As most students of economics know, however, "perfect efficiency" is an extremely simplified version of reality that does not exist outside the pages of the economics literature. Moreover, the very existence of a stable market equilibrium—the end result that CGE models are intended to calculate—has been drawn into serious question. In other words, the hypothetical economy contained within STAMP bears little resemblance to any real world economy.

STAMP is even more limited than some CGE models in that it assumes the economy is not only perfectly efficient, but also operating at its full potential. Among the most glaring of STAMP's departures from reality is that: "the economy is assumed … to run at full employment (by which we mean that there is no involuntary unemployment)" (BHI, What is STAMP?). This is in sharp contrast to other economic models like those built by Regional Economic Models, Inc. (REMI), which can account for the fact that

there is often some "slack" in the economy[1]. Ackerman and Gallagher (2004) put this shortcoming into context: the fact that CGE models like STAMP find it "impossible to model unemployment and recessions" is just one example of how "mathematical convenience … has … won out over realism about market imperfections" in CGE modeling. In practice, this assumption means that almost any economically productive role for government is out of the question, in part because there is never a lack of consumer demand, or a lack of jobs, that localized government initiatives can help address.

Ackerman et al. (2013) offer a revealing discussion of the problems with this "full employment" assumption:

> *This strange assumption greatly simplifies the model's calculations, and it may not be too far from the truth at times of very high employment, such as the late 1990s. Under today's economic conditions, however, the full employment assumption misses reality by a mile. In the world according to STAMP, the auto industry bailout of 2009 – or any other stimulus measure – couldn't possibly save any jobs, because no one who wants a job is ever out of work. So why not save taxpayers' money by letting the auto companies fend for themselves? Viewing public policy from this perspective, STAMP compares every proposed policy to an imaginary world of full employment. If you think you're starting from the top of the mountain, there's nowhere to go but down. In general, any model that assumes automatic full employment is irrelevant to real-world concerns about job creation at a time when unemployment is a pressing problem.*

"Full employment" is not the only jarringly unrealistic feature of the economy depicted in STAMP. Ackerman and Gallagher (2004), for example, note that the model's assumption of "perfect competition … does not describe the market economy as it actually exists; perfect competition among small, powerless firms does not characterize the likes of Microsoft, General Motors, AOL Time Warner, and ExxonMobil."

In STAMP, almost any economically productive role for government is out of the question, in part because there is never a lack of consumer demand, or a lack of jobs, that localized government initiatives can help address.

A similar limitation exists on the consumer side of the model. While the economic theory underlying CGE models asserts that the multitude of consumers in an economy each behave rationally and independently of one another, the reality is that the preferences of individual consumers are often interrelated and can therefore shift in dramatic and destabilizing ways. This is evidenced by the occurrence of economic bubbles, for example (Ackerman, 2002).

[1]Presentation by Paul L. Dion, Ph.D. Meeting of the Special Joint Legislative Commission to Study the Sales Tax Repeal Act of 2013. December 3, 2013. Available at: http://www.rilin.state.ri.us/CapTV/Pages/default.aspx. This discussion begins at minute 13:24.

Moreover, "perfect efficiency" also implies that taxpayers are all-knowing, or have "perfect information" about the alternatives available to them. The omniscient employees in a CGE model know, for example, the exact marginal income tax rates levied in their home state and in other locations, taking into account complex tax rules like the phase-out of deductions and credits, and generous federal tax write-offs for state tax payments. They are also fully aware of the post-tax price of every good sold in their home state, and on the other side of the state line. Of course, this assumption of "unlimited computing power" bears little resemblance to reality (Bell, 2009). And Stiglitz (2000) shows that this simplification has serious implications for any model's usefulness in the real world: "the long-standing hypothesis that economies with imperfect information would be similar to economies with perfect information—at least so long as the degree of information imperfection was not too large—has no theoretical basis."

Partially as a result of some of the market imperfections described above, serious doubts exist as to whether the market is even capable of reaching the kind of unique, stable equilibrium on its own that CGE models aim to compute in the wake of any policy change. Kirman (1989) argues that "the underlying assumptions of uniqueness and stability … have no theoretical justification." And as a result, "general equilibrium models … are, in reality, no more than special examples with no basis in economic theory as it stands."

Ackerman (2002) makes a similar observation, summarizing a number of studies finding that "cycles of any length, chaos, or anything else you can describe, will arise in a general equilibrium model for some set of consumer preferences and initial endowments." He also speculates that in the real world, social and political forces not captured by CGE models may be just as important as the "invisible hand" in bringing about the stability that often characterizes the economy between periods of economic upheaval. But very few readers of BHI's reports have any idea of the degree to which STAMP's model economy is divorced from reality. Mitra-Kahn (2008) explains that when constructing a CGE model, "any debate on the empirical validity of … long run equilibrium is ignored."

INADEQUATE DATA

The breadth of the STAMP model—which attempts to approximate the workings of entire state economies—leaves it vulnerable to additional weaknesses.

STAMP seeks to quantify how roughly 6,000 relationships (or "flows") are playing out between roughly 80 different economic sectors. Unfortunately, the quality of data available on these thousands of relationships often leaves much to be desired.

STAMP seeks to quantify how roughly 6,000 relationships (or "flows") are playing out between roughly 80 different economic sectors.[2] Unfortunately, the quality of data available on these thousands of relationships often leaves much to be desired. Ackerman and Gallagher (2004) observe that CGE models are often "forced to rely on opaque and arbitrary approximations of numerous poorly understood relationships. … Everyone doing rocket science uses exactly the same model of gravity – but economics is not rocket science, and every CGE model has its own picture of labor and product markets."

STAMP's supporting documents make clear that this is not an issue BHI has been able to avoid. In fact, given that STAMP is a state-level model, it is even more susceptible to this problem than the national models to which Ackerman was referring. BHI concedes that "data are less available at the sub-national than national level. This explains why scores of national CGE models have been built, but relatively few sub-national models" (BHI, What is STAMP?). Ha et al. (2010) make the significance of this clear when they state that "as a result [of data limitations], the level of uncertainty and the magnitude of errors in regional CGE models may be higher than those in national-level models."

Charney (2010c) observes that in STAMP, the lack of necessary data has sometimes been dealt with by making what are essentially "arbitrary" assumptions about the responsiveness of certain unstudied parts of the economy to changes in prices. [3]

[2] BHI has created STAMP models for a number of states. While most of those models are identified as having 81 sectors (and thus 6,561 flows), the Virginia model has 77 sectors (and 5,929 flows) and the North Dakota model has 79 sectors (and 6,241 flows). There appears to be a typo in the generic STAMP model description found on the BHI website as it claims that there are only 5,929 flows between the 81 sectors. This is a mathematical impossibility. See: BHI, What is STAMP?; BHI, 2004; Tuerck et al., 2012.

[3] In response to an initial round of criticism by Charney, BHI insisted, with minimal explanation, that "there is nothing arbitrary about the values we assign to elasticities" (BHI, 2010). Charney then elaborated on her criticism, noting that: "Manufacturing sectors represent 14 of the 27 non-government sectors in the STAMP model. The rest of the sectors (which represent the bulk of the economy) have no estimated import elasticities in the literature, so BHI arbitrarily set them. They could have omitted import elasticities for the sectors for which they had no estimates, but chose not to" (Charney, 2010c).

Charney also explains that the potentially serious impact of data limitations is likely to go undetected in CGE models like STAMP. While BHI claims that its "calibration" process, whereby it assigns values to the variables that link the model economy together "is a non-trivial step, and is essentially a way of checking that the model is working properly," Charney explains that:

> *[In CGE models] calibration is merely assigning values that fit the data. This is very different from the use of econometric statistical methods that have a whole assortment of statistical tests that can be used to test the validity of each variable in an equation and the validity of each equation in a model. No such statistical tests exist for numbers determined by 'calibration.'*

The description of CGE models provided by Purdue University's Global Trade Analysis Project makes a similar point:

> *While CGE models are quantitative, they are not empirical in the sense of econometric modeling: they are basically theoretical, with limited possibilities for rigorous testing against experience.*[4]

[4] Global Trade Analysis Project at Purdue University. "GTAP Models: Computable General Equilibrium Modeling and GTAP." Available at: https://www.gtap.agecon.purdue.edu/models/cge_gtap_n.asp. Downloaded on May 14, 2014.

PUBLISHED STAMP RESULTS GO BEYOND INTENDED PURPOSE OF CGE MODELS

Given all the limitations of CGE models, it should come as little surprise that many researchers caution against using them to produce the kinds of very specific economic estimates that BHI regularly publishes (and that policy advocates and the media are likely to latch onto).

The Inter-American Development Bank, for example, cautions that when working with CGE models: "interpretation of results should be focused more on magnitudes, directions, and distributive patterns rather than numeric outcomes themselves."[5] Charlton and Stiglitz (2004) similarly state that "we do not place much faith in the actual values derived from CGE analysis." And Devarajan and Robinson (2002) explain that "where particular estimates from CGE models have been influential, they have usually been confirmed by studies from other methods. In other cases, CGE models have played the role of uncovering a particular mechanism that had not been apparent before."

In the case of STAMP, however, the "mechanism" that BHI believes to be of importance has already been programmed in: lower taxes are always a boon to the economy, while increases in any tax will slow growth. Charney (2010c) explains that "the STAMP model incorporates every conceivable negative consequence of taxes that can be built into a model, regardless of the level of taxes in the state. It is built to compute negative tax effects." Some of the ways in which STAMP has been crafted to achieve this result are explained in the following sections.

[5] Inter-American Development Bank. "CGE Modeling Services, Frequently Asked Questions." Available at: http://www.iadb.org/en/topics/trade/frequently-asked-questions-faqs,1284.html. Downloaded on May 14, 2014.

UNDERVALUING GOVERNMENT SERVICES

Taxes exist first and foremost as a means of paying for public services like education, infrastructure, and public safety—all of which are essential to the functioning of any modern economy. Because of this, models that seek to quantify the economic impact of taxes must carefully consider the value of public services to the economy, not just their cost. As is explained in this section, STAMP's modeling of government's role in the economy is unrealistic in ways that bias it against any proposal that would raise revenue for public services, and in favor of any proposal that would reduce revenue and government spending.

A Passive Role for Government

Charney (2010c) explains that STAMP assigns government an oddly indirect role in the economy: "In STAMP, government doesn't seem to hire directly nor does it spend money in a way that would produce direct jobs in the private sector." Wing (2004) makes clear that this is a common problem in these types of models, observing that government's role in CGE models is "often passive: to collect taxes and disburse these revenues to firms and households as subsidies and lump-sum transfers."

In STAMP, government simply collects taxes from households and then gives the money back to them, making the whole exercise essentially pointless. In fact, it appears that government spending has a negative economic impact in STAMP because BHI assumes that each of the transfer payments it has dreamed up actually reduces households' work effort.

Under this construction, the economic benefit of taxes is trivial indeed. In STAMP, government simply collects taxes from households and then gives the money back to them, making the whole exercise essentially pointless. Dr. Paul L. Dion, Chief of Revenue Analysis for the Rhode Island Department of Revenue, explains that in STAMP "there are no indirect or induced effects from government spending" (or economic ripple effects) because the money is assumed to be spent out by households in much the same way that it would have been if the revenue was never collected in the first place.[6] In fact, it appears that government spending has a negative economic impact in STAMP because BHI assumes that each of the transfer payments it has dreamed up actually reduces households' work effort.[7]

[6] Presentation by Paul L. Dion, Ph.D. Meeting of the Special Joint Legislative Commission to Study the Sales Tax Repeal Act of 2013. December 3, 2013. Available at: http://www.rilin.state.ri.us/CapTV/Pages/default.aspx. This discussion begins at minute 15:40.

[7] The elasticity values representing "household response to transfer payments" range from -0.02 to -0.05 (BHI, What is STAMP?).

Mischaracterizing Government Spending

This simplistic portrayal of government is a major shortcoming of the STAMP model because governments spend their money on very different things than households, and those differences have important implications for the economic effects of that spending. Most importantly, states typically direct more of their spending toward labor-intensive services than households do, and they confine more of their spending to within the state's border. Charney (2010c) explains in response to a STAMP analysis of a sales tax change proposed in her home state of Arizona:

> *[Government] services employ more people per million dollars of expenditures than most other types of household expenditures. I don't think this is a hard concept for most people to understand. Using an extreme example, a one million dollar purchase of wide screen televisions will not create as many jobs in Arizona as spending one million dollars on education because the televisions aren't produced here and only the retail margin is retained in the state. STAMP lacks a sufficient mechanism to convert government spending to actual jobs.*

A Nearsighted View of Public Services

But STAMP's lack of realism in describing how government spending actually occurs is hardly its only shortcoming in this area. Charney (2010c) also explains how STAMP fails to acknowledge any long-term role for government in the economy:

> *Unfortunately, there is complete silence in the [STAMP] document about investment in human capital. They model nothing about the long-term effects of public education expenditures on human capital or on the supply of different labor skills. This is a major shortcoming for a model that is all about incentives, investment decisions and long-run production effects. Education is a major portion of state and local government expenditures and yet its role in long-run accumulation of human capital is totally ignored. Thus they ignore the long-run economic disadvantages of an area that has a poorly educated workforce associated with major reductions in education expenditures.*

This point was also underscored by Dr. Dion during a hearing in which the STAMP model was discussed in detail:

> *What about the impact on reductions in, say, education spending on … do you have a human capital function anywhere in there, or the labor force quality, or something that would have a negative impact? … If it's true that there's education spending that improves human capital, that's then used by firms, for example in their labor demand. To the extent that those two are correlated there's going to be some reduction obviously in the quality of labor as education spending declined. Assuming they are correlated.*[8]

[8] Meeting of the Special Joint Legislative Commission to Study the Sales Tax Repeal Act of 2013. October 21, 2013. Available at: http://www.rilin.state.ri.us/CapTV/Pages/default.aspx. This discussion begins at minute 52:40.

In response to Dr. Dion, BHI's Paul Bachman responded that "we do not" account for this issue in STAMP, and that additional education spending "at the margin" does not actually improve education or labor force quality.[9] BHI's assumptions on this issue were also hinted at in a 2013 report in which they argued against a Massachusetts tax package that would have boosted investments in education and infrastructure (Candela et al., 2013):

> *Infrastructure and education spending are important but beyond a certain level both initiatives meet head on with the law of diminishing returns … increased government spending on transportation and education is not only inefficient, but is also susceptible to politically vested interests, mismanagement, and cost overruns.*

STAMP views tax cuts as a free lunch, and tax increases as an economically "inefficient" way to reward "politically vested interests."

This assumption, while perfectly in line with BHI's stated mission to promote "limited government," is a major reason why STAMP consistently portrays state taxes as being harmful to economic growth.[10] In STAMP, the services being paid for with taxes, at the margin, are simply unimportant to the economy. And tax plans that BHI admits would require eliminating as many as 20,000 positions filled by teachers, firefighters, construction workers, and other government employees are depicted as being of great benefit to state economies (Tuerck et al, 2008). By assuming that spending can be cut without having to make meaningful sacrifices in terms of infrastructure quality or the quality of the labor pool, STAMP views tax cuts as a free lunch, and tax increases as an economically "inefficient" way to reward "politically vested interests."

A Murky View of Government Jobs

The lack of realism in BHI's modeling of the impacts of public sector spending is especially apparent in how it assumes tax changes will affect government employment. In many of its studies, BHI simply avoids any mention of the fact that government spending cuts will require layoffs or hiring freezes that will affect the total number of jobs available in the state. Studies produced by BHI in Maine and Rhode Island report only the impact of tax changes on "private jobs" or "private employment," while other studies in Massachusetts, Michigan, North Carolina, and the District of Columbia report only an "employment" figure, without any indication as to whether this figure includes changes in public sector jobs.

Equally troubling is the high degree of inconsistency present in those studies where BHI does attempt to estimate the impact of tax changes on public sector employment. As seen in Figure 1 on the following page, different STAMP studies have reached very different conclusions about the impact that a dollar of government spending has on the public sector workforce. Specifically, BHI seems to think that a $1 million cut (or increase) in government spending could result in government eliminating (or adding) anywhere between

[9] Ibid.

[10] Statement of Mission of the Beacon Hill Institute as listed on the Suffolk University College of Arts & Sciences website as of May 14, 2014. Available at: http://www.suffolk.edu/college/centers/14500.php.

1 and 37 jobs.[11] There are good reasons that this figure should vary between states and between different tax policies—such as differences in public sector pay, the share of public budgets devoted to wages and salaries, and the dedication of some tax revenues to specific purposes. But the huge degree of variation in BHI's findings raises questions about their reliability.

Figure 1: Government Jobs Created/Destroyed in STAMP Per $1 Million Revenue Gain/Loss*

State	Year of analysis**	Govt jobs per $1 million
Massachusetts	CY09	1.2
Massachusetts	CY10	1.2
Massachusetts	CY11	1.2
Massachusetts	CY12	1.2
Massachusetts	CY13	1.2
Massachusetts	FY11	2.0
Washington	CY13	7.4
Massachusetts	CY10	9.4
Massachusetts	CY10	9.4
South Carolina	FY10	10.1
North Dakota	2015	13.2
North Dakota	2010	14.0
North Dakota	2015	14.1
North Dakota	2015	14.4
North Dakota	2010	15.2
North Dakota	2010	15.2
Rhode Island	FY14	36.8

* See footnote 11 for the list of BHI studies included in this analysis.

** "CY" = calendar year. "FY" = fiscal year. BHI's North Dakota study did not specify whether the years analyzed were calendar or fiscal years.

To take just a few examples, a 2009 study of Massachusetts that used the STAMP model found that a sales tax increase it believed would raise $649 million in revenue would lead to the creation of 6,087 government jobs. A few years later in neighboring Rhode Island, however, a sales tax elimination proposal expected to have a much smaller impact on revenue collections (resulting in just $163 million in foregone revenue) was projected by BHI to result in the elimination of a very similar 6,000 government jobs. In other words, while each $1 million cut from Rhode Island's budget would require laying-off almost 37 employees, each $1 million gain for Massachusetts' coffers would result in the hiring of just 9 employees. That finding may have made sense if it somehow cost four times as much to employ a government worker in Massachusetts as compared to Rhode Island, but the reality is that government salaries are actually slightly higher in Rhode Island.[12]

The picture gets even more incoherent if one compares these studies to a "comprehensive business tax reform" for Massachusetts that BHI proposed in 2008. That reform would have cut into combined state and local revenues by some $79 million according to BHI, while miraculously requiring just 92 layoffs—or a little more than one lost job per million dollars in spending cuts.

[11] The following STAMP analyses were reviewed in constructing Figure 1: Angelini et al., 2008; Tuerck, 2008; Bachman, 2010; BHI, 2009a; BHI, 2009b; SCPC, 2009; Tuerck et al., 2010; RICFP, 2010b. Note that RICFP, 2013b did not report the number of public sector job losses, but Paul Bachman of the Beacon Hill Institute told the Rhode Island Special Joint Legislative Commission to Study the Sales Tax Repeal Act of 2013 that approximately 6,000 government jobs would be lost.

[12] Maynard, Melissa. "State Workers: What They Earn." Stateline [Washington, DC] 2 July 2013. Available at: http://www.pewstates.org/projects/stateline/headlines/comparing-state-salaries-to-private-pay-85899487682. Data for 2012 were downloaded on May 14, 2014.

HYPERSENSITIVITY TO INCOME TAX RATES

Charney and Vest (2003) explain that in computable general equilibrium (CGE) models: "Of particular concern to us is that results from these models are strongly dependent on the assumptions built into the model." Looking specifically at STAMP, Ackerman et al. (2013) observe that one of these assumptions is a "hypersensitivity to taxes." STAMP is designed so that the individuals and firms contained within the model will engage in dramatically more productive activity if their taxes are lowered, and dramatically less if their taxes are raised.

STAMP is designed so that the individuals and firms contained within the model will engage in dramatically more productive activity if their taxes are lowered, and dramatically less if their taxes are raised. Nowhere is this issue more apparent than in STAMP's assumption of how workers will react to a change in income tax rates.

Nowhere is this issue more apparent than in STAMP's assumption of how workers will react to a change in income tax rates. Figure 2 shows how STAMP's assumptions on this point compare to those used by the nonpartisan Congressional Budget Office (CBO). These assumptions differ in three important ways.

The first and most notable difference is that in STAMP, "high-income households are assumed to respond substantially to changes in the taxes and wage rates they face" (BHI, What is STAMP?, pp. 16). The high "elasticity" values (a measure of responsiveness) shown in Figure 2 for high-income taxpayers mean that, when compared to CBO's findings, STAMP assumes that income tax cuts will lead to a relative boom in private sector economic activity among high-income taxpayers, while income tax increases will quickly

Figure 2: Labor Supply Elasticity

Differing assumptions on the degree to which workers respond to changes in their after-tax wage

BHI STAMP Model*		Congressional Budget Office (CBO)**		
Income Group	**Total Elasticity**	**Income Group, Primary Earners**	**Substitution Elasticity**	**Income Elasticity**
Under $10,000	0.17	Lowest decile	0.31	-0.05
$10,000 - $25,000	0.17	Second decile	0.28	-0.05
$25,000 - $50,000	0.20	Third and fourth deciles	0.27	-0.05
$50,000 - $75,000	0.30	Fifth and sixth deciles	0.25	-0.05
$75,000 - $100,000	0.40	Top four deciles	0.22	-0.05
$100,000 - $150,000	0.50			
$150,000 and up	0.50	***Secondary Earners***	0.24 - 0.27	-0.05

* Beacon Hill Institute. "What is STAMP?" Downloaded on May 14, 2014.

** Congressional Budget Office. "How the Supply of Labor Responds to Changes in Fiscal Policy." October 2012.

dampen those same households' work effort (CBO, 2012). In explaining why they made this assumption, BHI simply cites "the literature" and their own "professional judgment" (BHI, What is STAMP?, pp. 16, 35). CBO, by contrast, released a thorough review of more than two dozen scholarly articles—thirteen of which were published after BHI first released their current elasticity estimates in 2004 (McClelland and Mok, 2012).[13]

The second difference is that BHI assumes that upper-income workers are much more likely than their poorer neighbors to seek out a job, increase their hours worked, or increase their productivity if their after-tax wage rate is increased. CBO's literature review, by contrast, led it to reach exactly the opposite conclusion. That review indicated that the relatively few studies supporting the BHI position have misinterpreted affluent taxpayers' ability to change the timing of their income with an actual change in their economic behavior.

These assumptions have stacked the model not just against income taxes in general, but also against progressive income taxes in particular.

The drop in reported income among upper-income taxpayers that sometimes follows a tax increase may initially seem to indicate that those taxpayers have dramatically slashed their hours or resigned their positions. More often than not, however, those taxpayers haven't changed their actual work effort, and have instead simply adjusted the schedule by which they collect certain types of income, such as stock options. By inverting reality and claiming that upper-income taxpayers, rather than the poor, are most sensitive to changes in taxes, STAMP is designed to show that regressive tax proposals are economically beneficial. According to STAMP, the economy thrives when taxes are shifted downward onto low-income people for whom BHI alleges taxes matter very little. These assumptions have stacked the model not just against income taxes in general, but also against progressive income taxes in particular.

Third and finally, CBO uses a more sophisticated system of elasticity measurements than BHI, involving separate treatment of "substitution" and "income" elasticities. Substitution elasticity is the issue that BHI tends to emphasize when it claims that raising the tax rate applied to a taxpayer's next dollar of earnings will reduce their incentive to work for that dollar. Income elasticity, on the other hand, works in exactly the opposite direction and recognizes that when taxpayers see their disposable income cut as a result of a tax increase, they tend to work more in order to maintain their previous standard of living. McClelland and Mok (2012) point out that substitution and income elasticities cannot simply be added together into one total elasticity measure because any given tax policy change can have very different effects on marginal tax rates (which matter for substitution elasticities) and average tax rates (which matter for income elasticities). It appears that STAMP does not take this nuance into consideration.

[13] All of the household-related elasticities found in BHI's most recent STAMP background paper (BHI, What is STAMP?) are identical to those published in the February 2004 description of the Virginia-STAMP model (BHI, 2004).

HYPERSENSITIVITY IN BUSINESSES' DECISION-MAKING

Workers are not the only group that STAMP assumes are very sensitive to changes in their tax rates. In STAMP, businesses' decisions can be altered in a similarly dramatic fashion through changes in tax policy. Of particular interest here is what is known as the "factor substitution elasticity," or the tendency of businesses to switch between using more workers (labor), or more machinery (capital), to carry out their business when the cost of those inputs changes.

If the value of this elasticity is assumed to be large, raising the cost of labor through a higher payroll tax will cause businesses to start laying off workers and moving toward a more automated production process. Similarly, if the cost of machinery is raised through something like a sales or property tax, then according to STAMP businesses will stop investing in new machinery and may opt for a more low-tech approach. In either case, changes in tax rates are assumed to produce large and harmful "distortions" into businesses' decision-making processes.

As is the case with many of the economic variables contained in STAMP, it is not completely clear what value for the "factor substitution elasticity" best approximates the workings of the actual economy. BHI admits that there is huge variation in the literature on this point, citing values as low as 0.15 and as high as 1.809 (BHI, What is STAMP?). As in the case of the labor supply elasticities reviewed in the previous section, however, BHI has once again chosen to err on the side of high sensitivity to tax changes. Specifically, BHI's chosen values of 0.8 to 0.9 are significantly higher than the 0.4 to 0.6 value found in a very detailed and widely cited literature review (Chirinko, 2008).

Further research indicates that this issue is of significant importance. Fox and Fullerton (1991) tested how the results of a CGE model changed when the factor substitution elasticity was varied and found that "the assumed value of this elasticity has greater impact on the results of the policy simulations than all of the additional modeling complications combined." And Chirinko et al. (2004), Roeger et al. (2002), and Engen (1997) showed that raising this value from 0.5 to 1.0 can increase the apparent economic impact of a tax change by as much as 79 percent.

CONSUMERS' DECISION-MAKING IN STAMP BEARS LITTLE RESEMBLANCE TO REALITY

The consumption habits of the individuals and firms modeled in STAMP are both overly simplistic and generally more sensitive to tax changes than most evidence suggests. Of particular concern is the way in which consumers in STAMP quickly and dramatically shift their consumption toward out-of-state goods and services if prices in their own state rise as a result of a tax increase. This is no small issue, as analyses of sub-national economies have shown that this "import elasticity" assumption can have a significant impact on the results produced by CGE models. Ha et al. (2010) find that when CGE modelers use "outdated estimates from past literature; or only 'best guesses' when no published figures are available … any simulation results are likely to be inaccurate." This is precisely the case in STAMP.

In justifying their choice of how responsive consumers will be to changes in prices, BHI cites studies using national and international level data published more than two decades ago. This is an odd choice given that newer analyses suggest that the decision to purchase goods produced in-state or out-of-state is far less sensitive to price changes than BHI assumes.

In justifying their choice of how responsive consumers will be to changes in prices, BHI cites Reinert and Roland-Holst (1992) and Roland-Holst et al. (1994), both of which used national and international level data published more than two decades ago. This is an odd choice given that in the years since these studies were published, the U.S. Census Bureau, U.S. Department of Commerce, and the Bureau of Transportation Statistics have collaborated to produce—and periodically update—a new dataset that allows for these kinds of analyses to be done at the sub-national level.[14]

These newer analyses suggest that the decision to purchase goods produced in-state or out-of-state is far less sensitive to price changes than BHI assumes. Ha et al. (2010) examined how consumers respond to changes in the price of thirteen commodities in the Illinois economy. Nearly nine in ten of the elasticity values estimated in that study were lower than the value that BHI uses for most industries (1.5). In fact, two-thirds of the elasticities were below 1.0.[15] Bilgic et. al. (2002) reached a similar conclusion, with 86 percent of their elasticity estimates below BHI's 1.5 value and most falling below 1.0.[16] In other words, BHI has plugged into its STAMP model an assumption that consumers will react more dramatically to changes in prices than the most relevant studies have found.

[14] The Commodity Flow Survey is available at: http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/commodity_flow_survey/index.html.

[15] Import elasticity values for thirteen industries were estimated using two different models. Out of twenty-six total estimates produced using these models, twenty-three fell below 1.5 and seventeen fell below 1.0.

[16] Out of twenty-six total elasticity estimates, eighteen fell below 1.5 and twelve fell below 1.0.

More puzzling than BHI's blind spot to the newest literature on this topic is that Reinert and Roland-Holst (1992), which BHI specifically claims to have used in setting its elasticity values, finds a mean import elasticity of just 0.61 (Charney, 2010b). BHI obscures this fact in their What is STAMP? background paper by drawing the reader's attention toward the outlier value of 3.49 that Reinert and Roland-Holst (1992) found only for purchases of "wine, brandy, and brandy spirits."

The problems with STAMP's import elasticity assumptions become even more apparent when looking at specific commodities. STAMP's 1.5 elasticity for purchases of food products is well above the 0.5 to 1.28 range found in the sub-national studies referenced above (Ha et al., 2010 and Bilgic et. al., 2002). STAMP's 1.5 assumption for apparel products is similarly far above the 0.068 to 0.45 value found in that sub-national literature. Similarly, Charney (2010b) explains that the 1.5 elasticity value used by STAMP for utility purchases is clearly far too high because utility consumers "can't just choose to import more of their electricity and natural gas from out of state. They are stuck buying utilities from local utility companies." And even BHI itself, when pressed by Charney, conceded that their 1.5 value for "elasticity of imports may be high for sectors like construction" (BHI, 2010).

STAMP assumes that the consumption decisions occurring in the vast majority of industries can be modeled with a uniform elasticity assumption of 1.5. This lack of variability in STAMP's elasticity values across industries is inappropriate both because there are good theoretical reasons that these values should vary across industries (as in the example of utility companies), and because there are empirical estimates that would have allowed BHI to vary these values (as seen with the apparel and food industry values provided above).

IMMEDIATE IMPACTS ARE IGNORED

BHI frequently refers to STAMP as a "five-year" model (BHI, What is STAMP?). This label suggests that STAMP is capable of providing information about the impact that a tax proposal will have on revenues and job creation during the years immediately following its enactment. This is not the case.

While BHI rarely makes this point known in their own reports, their clients at the Rhode Island Center for Freedom and Prosperity (RICFP) felt it necessary to explain that "It is important to acknowledge … that the dynamic effects predicted by [STAMP] derive from an 'equilibrium model.' That means that the overall change in jobs and tax revenue is the effect on a single year of baseline data *after* the economy has adjusted to the new reality. That could take six months, or it could take 18 months" (RICFP, 2013b). In fact it could, and very likely would, take significantly longer than 18 months.

The "new reality" projected by STAMP often involves major developments such as the migration of a significant number of people into a state, the creation of new businesses, the transformation of existing businesses' production processes (see the earlier discussion of "factor substitution elasticity"), the construction of new buildings, and an increase in property values.[17] None of these events tend to happen very quickly in the real world. [18]

Using the REMI PI+ model, Rhode Island's Office of Revenue Analysis (ORA) found that the immediate, first year impact on private sector jobs from repealing Rhode Island's sales tax would be less than one-fifth the size of the impact occurring in the fifth year, after more of the economic changes just described had time to unfold.[19] Even by the second year (roughly in line with the 18 month transition period that RICFP acknowledged was possible), less than half of the eventual impact on the Rhode Island private sector job market would have been realized.

Taking the STAMP results at face value, by contrast, would lead the reader to believe that there would be little difference between the short- and medium-term impacts of sales tax repeal. In fact, the fourth year

[17] Paul Bachman of BHI mentioned some of these economic effects that he expected to occur in the wake of sales tax repeal during: Meeting of the Special Joint Legislative Commission to Study the Sales Tax Repeal Act of 2013. October 21, 2013. Available at: http://www.rilin.state.ri.us CapTV/Pages/default.aspx. This discussion begins at minute 20:10.

[18] This criticism has been made of previous BHI reports. Leachman et al. (2012) discuss how two separate BHI papers "conclude that if North Dakota banned property taxes, new business investment in the state would explode almost immediately, growing by a third or more in the first year after implementation. Such a huge, immediate boom in business investment … over and above North Dakota's already rapid economic growth — is highly unlikely."

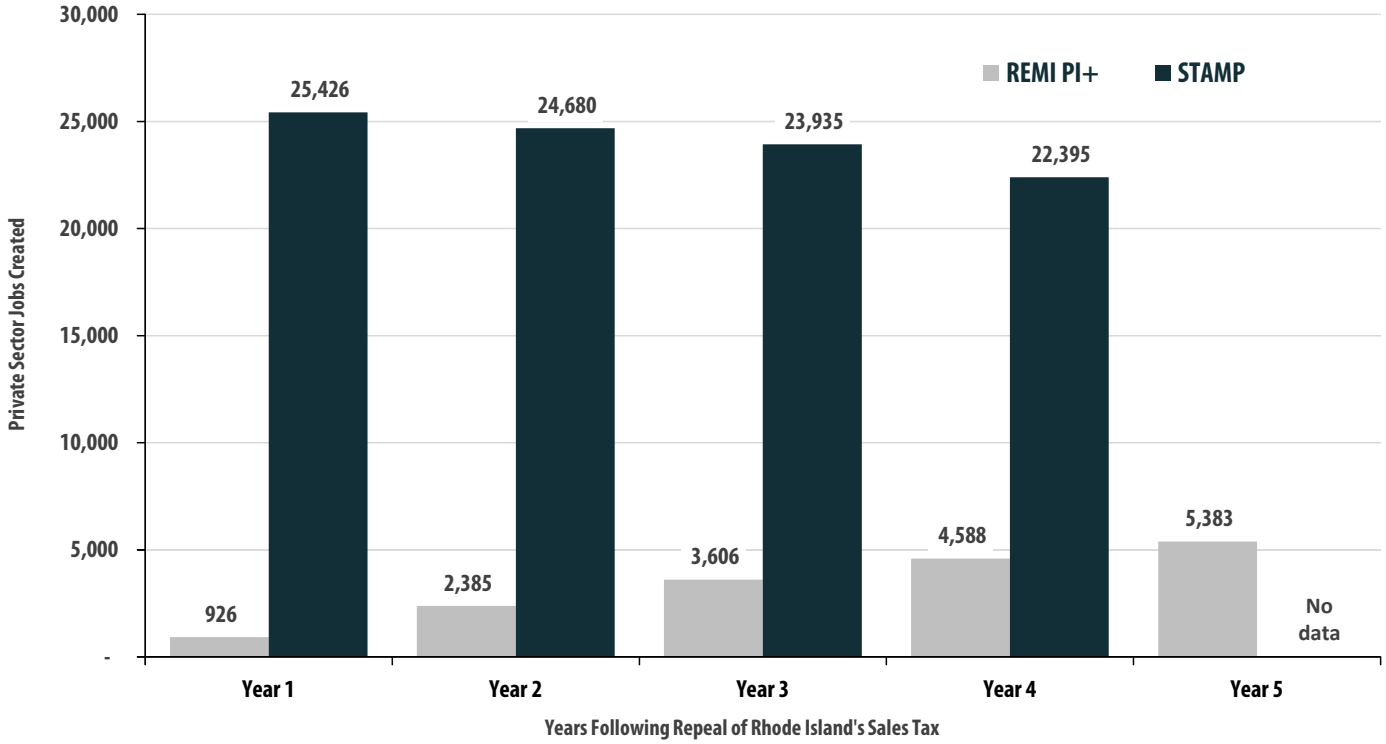
[19] The 926 private jobs gained in Year 1 are equal to 17.2 percent of the 5,383 private sector job gains forecast for Year 5. Presentation by Paul L. Dion, Ph.D. Meeting of the Special Joint Legislative Commission to Study the Sales Tax Repeal Act of 2013. December 3, 2013. Available at: http://www.rilin.state.ri.us/CapTV/Pages/default.aspx.

job figure generated by STAMP was actually somewhat smaller than the impact presented as occurring in the first year (RICFP, 2013a). Figure 3 shows this difference in the trajectory of economic estimates produced using STAMP and REMI PI+, as well as the large difference in the magnitude of those models' estimates (an issue discussed in the next section).

This shortcoming has significant implications for the usefulness of the STAMP model, the most serious of which being that STAMP analyses are of no use in informing the debate over what will be necessary to balance the state's budget in the wake of a major tax change. Presumably, one of the primary reasons that BHI releases "dynamic" revenue estimates is to give the impression that tax cuts are far less costly than as they appear, as long as the enormous economic gains alleged to occur in their wake are taken into consideration. But since those gains are virtually guaranteed to be slow in coming to fruition(if they occur at all), the model's findings cannot inform decisions affecting states' current budget windows.

Moreover, front-loading the economic impact also masks the immediate effects that tax proposals can have on pressing issues like unemployment. While private sector jobs gains will invariably be slow to ma-

Figure 3: Economic Impact of Tax Cuts in STAMP is Large and Instantaneous, Yet Can Begin to Immediately Decline Over Time



Note: These figures exclude public sector job losses, which in REMI PI+ actually outnumber the private sector gains.
Source: Institute on Taxation and Economic Policy (ITEP) analysis of data from the Rhode Island Office of Revenue Analysis and the Rhode Island Center for Freedom & Prosperity.

terialize for the reasons mentioned above, the same cannot be said of changes in public sector employment. If a large tax cut requires $900 million in reduced spending in next fiscal year, for example, public sector layoffs, furloughs, and hiring freezes will have to begin very quickly in order to bring state spending within the limits of the new budget. This is a major reason why, in sharp contrast to the STAMP analysis, REMI PI+ found that sales tax repeal would have a particularly harmful impact on employment in the years immediately following its enactment. While the long-term impact of sales tax repeal would be a loss of 590 jobs according to REMI PI+, the impact during the first twelve months after implementation would be a net loss of almost 7,500 jobs.[20]

REMI AND STAMP

The economic models maintained by Regional Economic Models, Inc. (REMI) are much more widely used than STAMP for evaluating the economic impact of state and local tax changes. REMI's peer-reviewed PI+ model, for example, is used by most state governments, as well as academic researchers and various for-profit and non-profit institutions.

Like STAMP, REMI has a computable general equilibrium (CGE) component. As a result, it is subject to some of the same shortcomings explained in the opening sections of this paper, such as data limitations and its assumption that the economy is capable of reaching a stable equilibrium.

But REMI goes farther than STAMP in bringing together other modeling techniques such as input-output models, econometric models, and economic geography. REMI describes this approach as "incorporating the strengths of each methodology while overcoming its limitations."

One area in which REMI has constructed a more realistic picture of the economy than STAMP is in its allowance for "slack" in the economy—such as the existence of involuntary unemployment. As explained earlier, STAMP assumes that everybody who wants a job has one. REMI is not limited in this way.

REMI also outperforms STAMP in its allowance for gradual transitions in the wake of a policy change. STAMP, by contrast, presents economic impacts as occurring instantaneously, even when those economic impacts involve inherently long-run phenomena such as worker migration or changes in property values.

Perhaps most importantly of all, REMI recognizes that governments and households do not spend money in the same ways, and that those differences affect the economic impact of each sector's spending. STAMP, on the other hand, assumes that government spending is simply redistributed to households and then spent by those households on the typical things they buy everyday. This unrealistic depiction of government spending is one of the most glaring ways in which STAMP departs from REMI, and from reality.

Like any economic model, REMI is an imperfect representation of reality. But it comes far closer to approximating the real world than does STAMP.

[20] ORA's Year 5 estimate is that 5,383 new private sector jobs would be more than offset by the loss of 5,973 state and local government jobs (for a net loss of 590 jobs). ORA's Year 1 estimate is that 926 new private sector jobs would be more than offset by 8,423 public sector job losses (for a net loss of 7,497 jobs). See Presentation by Paul L. Dion, Ph.D. Meeting of the Special Joint Legislative Commission to Study the Sales Tax Repeal Act of 2013. December 3, 2013. Available at: http://www.rilin.state.ri.us/CapTV/Pages/default.aspx.

STAMP RESULTS OUT OF LINE WITH OTHER STUDIES, PAST EXPERIENCE

In light of the information contained in this report, there is cause to be deeply skeptical of the results produced by CGE models such as STAMP. Writing about CGE models in general, Charney and Vest (2003) note that "it is not clear how accurate they are quantitatively," while Ackerman (2001) goes one step further, explaining that "there is ample evidence to show that forecasts based on CGE models have been quite inaccurate." When the general problems with CGE models are combined with additional limitations and biases contained specifically in STAMP, it should come as little surprise that analyses produced using the STAMP model have routinely been called into question.

Arizona

In Arizona, the problems with STAMP were on full display when its results were found to be in direct conflict with those produced using more mainstream models housed at the University of Arizona (UA) and Arizona State University (ASU). According to STAMP, a temporary sales tax increase backed by Governor Brewer would result in a loss of over 9,000 jobs. UA's IMPLAN input-output model and ASU's REMI model, however, each estimated that the increase would actually save more than 8,000 jobs on net by allowing the state to avoid deep budget cuts after its revenues were battered by the Great Recession (Charney, 2010a and Hoffman and Rex, 2009). Voters apparently agreed with the UA/ASU assessment, eventually approving the sales tax hike by a margin of 64-36 percent. [21]

Rhode Island

In an analysis worthy of the label "voodoo economics," BHI estimated that a 57 percent sales tax reduction would actually raise $61 million in revenue on net.

In Rhode Island, the story is remarkably similar. Dr. Paul L. Dion, the head of Rhode Island's Office of Revenue Analysis (ORA), was visibly baffled upon learning that STAMP estimated Rhode Island could create 19,426 jobs by eliminating its sales tax. He noted that "we've run models ourselves and we find very different results from what you have."[22] Using its in-house REMI PI+ model, ORA found that repealing the sales tax and paying for it by scaling back public services would ultimately

[21] State of Arizona Official Canvas for the 2010 Special Election. Available at: http://www.azsos.gov/election/2010/may_Special/2010_Special_Election_Official_Canvass.pdf. Downloaded on May 14, 2014.

[22] BHI's published estimate indicates that sales tax repeal would create 25,426 jobs, but this does not include the roughly 6,000 public sector job losses that BHI later conceded would have to occur in order to balance the state's budget. Dion's comment was made during: Meeting of the Special Joint Legislative Commission to Study the Sales Tax Repeal Act of 2013. October 21, 2013. Available at: http://www.rilin.state.ri.us/CapTV/Pages/default.aspx. Minute 45:46

lead to a loss of 590 jobs in the state.[23] Even if the sales tax could somehow be repealed without affecting the state budget, ORA found that repeal would at most lead to the creation of 10,649 new jobs—or roughly half the number that STAMP predicted.

A subsequent STAMP analysis of a 57 percent sales tax cut in Rhode Island (taking the rate from 7 to 3 percent) produced even less plausible results (RICFP, 2013a). In an analysis worthy of the label "voodoo economics," BHI estimated that this sharp tax reduction would actually raise $61 million in revenue on net. Specifically, the $516 million revenue loss expected to result from such a change would be more than offset by a $468 million "dynamic" gain in state income, sales, and excise tax revenues and a $109 million gain in local tax collections as the state's economy boomed.[24] The result would be a free lunch for Rhode Island taxpayers: lower taxes without any reduction in government services.[25]

ORA did not use REMI to estimate the local revenue impact of cutting the sales tax rate to 3 percent, but its state-level findings differed sharply from STAMP. While STAMP predicted that the state would lose just $48 million in revenue after taking economic growth into account, REMI forecast that the state loss would be more than six times that size, or $305 million per year.[26]

Massachusetts

BHI's analyses have also been drawn into question in its home state of Massachusetts. In 2011, STAMP was used by BHI to claim that the "Romneycare" health care reform had resulted in the elimination of 18,313 jobs in the Bay State. When FactCheck.org pointed out that the state's largest business group, as well as Dr. Jonathan Gruber of the Massachusetts Institute of Technology (MIT), were skeptical of the study's findings, one of the authors conceded that the STAMP analysis could not be verified and said that if "you would do a survey… you would probably get a better picture." [27]

[23] ORA found that the gain of 5,383 private sector jobs in Year 5 would be more than offset by the loss of 5,973 state and local government jobs in that same year. Meeting of the Special Joint Legislative Commission to Study the Sales Tax Repeal Act of 2013. December 3, 2013. Available at: http://www.rilin.state.ri.us/CapTV/Pages/default.aspx.

[24] An additional problem with this calculation arises in Rhode Island because this degree of local revenue gain would likely be forbidden under current statewide limits on property tax revenue growth. This seems to be a flaw in how the model was used, however, rather than a problem with the model itself. See Conversation between by Paul L. Dion, Ph.D., Mike Stenhouse, and Justin Katz. Meeting of the Special Joint Legislative Commission to Study the Sales Tax Repeal Act of 2013. December 3, 2013. Available at: http://www.rilin.state.ri.us/CapTV/Pages/default.aspx. Minute 150:39.

[25] According to BHI's calculations, state government revenues are projected to decline by $48 million per year under this scenario. Since localities are projected to gain $109 million in revenue, the state could reduce local aid by any amount between $48 million and $109 million in order to avoid any cuts in public services at either the state or local level.

[26] Paul L. Dion, Ph.D. "Modeling Alternative Sales Tax Proposals: Response to the Joint Legislative Commission to Study the Sales Tax Repeal Act of 2013." December 13, 2013. Slide 12.

[27] Robertson, Lori. "Romney's Health Care Law Killed Jobs?" FactCheck.org 27 Sept. 2011. Available at: http://factcheck.org/2011/09/romneys-health-care-law-killed-jobs/.

Two years later, STAMP found that an income tax hike proposed by Governor Deval Patrick would have a remarkably negative impact on the state's economy—costing it 17,800 jobs (Candela et al., 2013). Drs. Alan Clayton-Matthews and Barry Bluestone of Northeastern University strongly disagreed with this assessment, arguing in testimony before the state legislature that:

> *The spending that is taken out of the private sector through increases in taxes will not result in slower economic growth in the next or coming fiscal years. In fact, the program will have a mild positive economic impact in the short-term. … A back-of-the-envelope multiplier analysis suggests that the short-run effect of the tax and spending plan would be to raise state real gross domestic product by about one-quarter of one percent, not lower it. … these investments in our people and our infrastructure will [also] strengthen the state economy in the long run.*[28]

Kansas

In Kansas, a STAMP analysis recently concluded that sizeable income tax cuts enacted in 2012 will result in the creation of between 33,430 to 41,690 new jobs (Davidson et al, 2012). While it is too early to know what the precise economic effects of this "real live experiment" in tax policy will be, the results so far cast serious doubt on STAMP's conclusions.[29] Leachman and Mai (2014) observe that growth in Kansas jobs, incomes, and business establishments has lagged the country as a whole following the implementation of the tax cuts. These trends have not gone unnoticed inside or outside of the state. In April 2014, Moody's Investors Service downgraded the state's credit rating, citing both the tax cuts and the lack of robust economic growth in their wake:

> *The downgrade reflects Kansas' relatively sluggish recovery compared with its peers, the use of non-recurring measures to balance the budget, revenue reductions (resulting from tax cuts) which have not been fully offset by recurring spending cuts, and an underfunded retirement system for which the state is not making actuarially required contributions. … The phasing in of increasing income tax cuts, along with rising pension costs, will continue to exert pressure on the budget.*[30]

[28] Clayton-Matthews, Alan and Barry Bluestone. "Testimony Presented to the Joint Committee on Revenue Relative to the Need to Raise Revenues and Related Tax Issues." Boston, Massachusetts. March 26, 2013.

[29] This "real live experiment" description of the tax cut package was first used by Kansas Governor Sam Brownback. See Rothschild, Scott. "Brownback gets heat for 'real live experiment' comment on tax cuts." Lawrence Journal-World 19 June 2012. Available at: http://www2.ljworld.com/news/2012/jun/19/brownback-gets-heat-real-live-experiment-comment-t/.

[30] Moody's Investors Service. "Rating Action: Moody's downgrades Kansas issuer rating to Aa2 from Aa1, notched ratings to Aa3 from Aa2 and KDOT highway revenue bonds to Aa2 from Aa1; outlook stable." Global Credit Research, New York. April 30, 2014. Available at: https://www.moodys.com/research/Moodys-downgrades-Kansas-issuer-rating-to-Aa2-from-Aa1-notched--PR_298383.

Moody's went on to explain that its analysis was not narrowly focused on the state's short-term outlook, and said that going forward, Kansas' economy "is likely to underperform the nation due to sluggishness in key manufacturing sectors." The agency also cautioned that further downgrades could result if the state chooses to rely on "aggressive growth assumptions based on elimination of income tax."[31] In other words, it would be fiscally irresponsible for lawmakers to put their trust in the kinds of rosy economic projections produced by STAMP when they are crafting future state budgets.

Other states

The above examples should come as little surprise given that there is ample evidence that state tax cuts have not been the magic economic elixir that STAMP consistently predicts. Looking back at the economic fortunes of those states that enacted the largest personal income tax cuts in the 2000's, Leachman et. al. (2013) observe that:

> *Of the six states that enacted large personal income tax cuts in the years before the recession, three states saw their economies grow more slowly than the nation's in subsequent years, and the other three saw their economies grow more quickly. The three that grew quickly are all major oil-producing states that benefitted from a sharp rise in oil prices in the years after they implemented their tax cuts. In other words, all of the lesser- and non-oil-producing states that enacted big personal income tax cuts in the 2000s grew more slowly than the national average.*

This finding is consistent with numerous academic studies that have found state taxes to have either a negligible effect on economic growth, or no measurable effect at all (Mazerov, 2013).

In understanding why the relationship between taxes and growth is more complex than the STAMP model suggests, it is important to keep in mind that taxes do not exist for their own sake. Lower taxes come at the price of less spending on education or a less efficient transportation network—outcomes that are detrimental to any state's economy. BHI's STAMP model, however, does not allow for the possibility that taxes are anything but a drag on economic growth. As Charney (2010c) explains, "the STAMP model incorporates every conceivable negative consequence of taxes that can be built into a model, regardless of the level of taxes in the state. It is built to compute negative tax effects."

[31] Ibid.

CONCLUSION

STAMP's flimsy foundation, biased assumptions, and highly questionable results are ample reason to avoid using it as a tool for understanding how changes to a state's tax system will affect its economy. STAMP is designed in such a way that it almost invariably portrays tax cuts as being good for state economies, despite the fact that more mainstream economic models, academic studies, and states' actual experience with tax cuts do not support such a finding.

REFERENCES: BEACON HILL INSTITUTE REPORTS AND ANALYSES

Angelini, J. P., F. Conte, Alfonso Sanchez-Penalver, and D. G. Tuerck. (2008). 'Business Taxes in Massachusetts: Toward Fundamental Reform.' Beacon Hill Institute. Available at: http://www.beaconhill.org/BHIStudies/BizTaxReformMA08/BHICorporateTaxReform080408.pdf.

Bachman, P. (2010). 'The Economic Impact of Initiative 1098 in Washington State.' The Evergreen Freedom Foundation. Available at: http://www.myfreedomfoundation.com/doclib/PHI-1098.pdf.

Beacon Hill Institute (BHI). 'What is STAMP?' Available at: http://www.beaconhill.org/STAMP-Method/STAMP.pdf. Downloaded on May 14, 2014.

Beacon Hill Institute (BHI). (2004). 'Virginia-STAMP: A Sophisticated Tax Model for Virginia.' Available at: http://www.thomasjeffersoninst.org/pdf/articles/va-stampreport.pdf.

Beacon Hill Institute (BHI). (2009a). 'Massachusetts Sales Tax Hike Would Destroy 10,000 Jobs and $41 million in Investment.' BHI FaxSheet. Available at: http://www.beaconhill.org/FaxSheets/2009/MA-SalesTaxHikeProposa090417.pdf.

Beacon Hill Institute (BHI). (2009b). 'Massachusetts Sales Tax Hike Would Destroy 12,000 Jobs and $51 million in Investment.' BHI FaxSheet. Available at: http://www.beaconhill.org/FaxSheets/2009/MA-SalesTaxHikeRev0625.pdf.

Beacon Hill Institute (BHI). (2010). 'The Beacon Hill Institute's Tax Analysis Modeling Program: A Response to Charney.' Available at: http://www.beaconhill.org/STAMP-Method/BHIRebuttalToCharneyAZ10-0422.pdf.

Beacon Hill Institute (BHI). (2011). 'The Impact of Bill 18-150 on the Economy of Washington, D.C.' Available at: http://s3.amazonaws.com/atrfiles/files/files/BHI_Report.pdf.

Beacon Hill Institute and Pelican Institute for Public Policy (BHI and PIPP). (2013). 'The Economic Benefits of Tax Reform in Louisiana.' Policy Analysis. Available at: http://www.thepelicanpost.org/2013/03/26/new-study-governor-jindals-tax-reform-plan-benefits-louisiana-economy/.

Candela, R., F. Conte, and P. Bachman. (2013). 'Proposed Tax Increases for Infrastructure and Education in the Commonwealth: An Economic Analysis.' Beacon Hill Institute. Available at: http://www.beaconhill.org/BHIStudies/MA-FY2014/PatrickMAGovHiouse-SenateTaxReformProposals2013-0521.pdf.

Davidson, T., D. G. Tuerck, P. Bachman, and M. Head. (2012). 'Tax Reform Gears Kansas for Growth: A dynamic analysis of additional revenue and jobs generated by tax reform.' Kansas Policy Institute. Avail-

able at: http://www.kansaspolicy.org/ResearchCenters/BudgetandSpending/BudgetandSpendingStudies/95638.aspx.

Goldwater Institute. (2010). 'Lawmakers Consider Sending One-Cent Sales Tax Increase to Voters.' Press Release. Available at: http://goldwaterinstitute.org/article/lawmakers-consider-sending-one-cent-sales-tax-increase-voters.

Haughton, J., J. Barrett, and S. Codreanu. (2003). 'The Robustness of Regional Computable General Equilibrium Models.' Department of Economics and Beacon Hill Institute, Suffolk University. Available at: http://www.beaconhill.org/STAMP-Method/RobustnessPaper1.pdf.

Rhode Island Center for Freedom & Prosperity (RICFP). (2013a). 'Alternative Sales Tax Reduction Scenarios: Detailed Charts of RI-STAMP Results.' Available at: http://www.rifreedom.org/wp-content/uploads/salestaxcommission-detailedscenarios-120213.pdf.

Rhode Island Center for Freedom & Prosperity (RICFP). (2013b). 'Zero.Zero Sales Tax.' Available at: http://www.rifreedom.org/wp-content/uploads/Zero-point-Zero-2013-final-wattachment.pdf.

South Carolina Policy Council (SCPC). (2009). 'Proposed Cigarette Tax Increase to Cost SC 4,100 Private-Sector Jobs.' Available at: http://www.scpolicycouncil.org/research/taxes/proposed-cigarette-tax-increase-to-cost-sc-4100-private-sector-jobs.

Thompson, M. W. (2013). 'Tax Restructuring in Virginia.' The Thomas Jefferson Institute for Public Policy. Available at: http://www.thomasjeffersoninst.org/files/3/TaxRestructuring4-13update.pdf.

Tuerck, D., S. Glassman, and P. Bachman. (2007). 'Tax Changes in Michigan: Measuring the Effects of Expanding the Sales Tax to Services.' Beacon Hill Institute. Available at: https://www.mackinac.org/archives/2007/bhi%20report.pdf.

Tuerck, D., M. Head, P. Bachman, and A. Sanchez-Penalver. (2008). 'Question 1: A Best-Case Scenario.' Beacon Hill Institute Policy Study. Available at: http://www.beaconhill.org/BHIStudies/Question-1PIT-2008/Question1-081020Final.pdf.

Tuerck, D., P. Bachman, M. Head, and B. Narloch. (2010). 'Eliminating Property Taxes in North Dakota.' Beacon Hill Institute. Available at: http://www.policynd.org/images/uploads/ND-Stamp_Final.pdf.

Tuerck, D., P. Bachman, and M. Head. (2011a). 'An Economic Analysis of State Tax Changes in North Carolina.' Beacon Hill Institute Policy Study. Available at: http://www.johnlocke.org/site-docs/research/BHIpolicystudy050911.pdf.

Tuerck, D., P. Bachman, and M. Head. (2011b). 'Maine's Biennial Budget: Tax Cuts to Spur Job Growth.' Beacon Hill Institute Policy Study. Available at: http://www.beaconhill.org/BHIStudies/Maine2011/BHI-METaxReport051711.pdf.

Tuerck, D., P. Bachman, and M. Head. (2012). 'ND-STAMP: Methodology.' Beacon Hill Institute. Available at: http://www.policynd.org/images/uploads/ND_STAMP_Metho_2012.pdf.

Tuerck, D., P. Bachman, and M. Head. (2013). 'A Consumed Tax Proposal for North Carolina.' Beacon Hill Institute Policy Study. Available at: http://s3.amazonaws.com/cjtv-video/USATaxBHIAnalysis0113.pdf.

ADDITIONAL REFERENCES

Ackerman, F. (2002). 'Still dead after all these years: interpreting the failure of general equilibrium theory.' Journal of Economic Methodology, 9(2): 119-139. Available at: http://ase.tufts.edu/gdae/Pubs/rp/StillDead02.pdf.

Ackerman, F., K. Gallagher, and A. Nadal. (2001). 'The Limits of Economic Modeling in the FTAA Environmental Review.' Globalization and Sustainable Development Program Background Paper. Medford, MA: Tufts University, Global Development and Environment Institute. Available at: http://www.ase.tufts.edu/gdae/policy_research/USTRComments&Summary.pdf.

Ackerman, F., and K. P. Gallagher. (2004). 'Computable abstraction: General equilibrium models of trade and environment.' In Ackerman, F., and A. Nadal. (eds.), The Flawed Foundations of General Equilibrium: Critical essays on economic theory, London, Routledge. Available at: http://digamo.free.fr/ackerman4.pdf.

Ackerman, F., T. Vitolo, E. A. Stanton, and G. Keith. (2013). 'Not-so-smart ALEC: Inside the attacks on renewable energy.' Synapse Energy Economics, Inc. Cambridge, MA. Available at: http://www.kftc.org/sites/default/files/docs/resources/synapse_alec_jan4.13.pdf.

Bell, W. P. (2009). 'Adaptive interactive expectations: dynamically modeling profit expectation.' Munich Personal RePEc Archive Paper No. 38260. Available at: http://mpra.ub.uni-muenchen.de/38260/.

Bilgic, A., S. King, A. Lusby, and D. F. Schreiner. (2002). 'Estimates of U.S. Regional Commodity Trade Elasticities of Substitution.' The Journal of Regional Analysis and Policy, 32(2): 79-98. Available at: http://www.jrap-journal.org/pastvolumes/2000/v32/32-2-3.pdf.

Charlton, A. H., and J. E. Stiglitz. (2004). 'A Development-Friendly Prioritization of Doha Round Proposals.' Working Paper. Initiative for Policy Dialogue at Columbia University, Task Force on Trade. Available at: http://academiccommons.columbia.edu/catalog/ac:126715.

Charney, A. H. (2010a). 'Sales Tax Increase vs. Expenditure Cuts: An Economic Impact Study.' University of Arizona, Eller College of Management, Economic and Business Research Center. March 19, 2010. Available at: http://ebr.eller.arizona.edu/research/articles/2010/sales_tax_increase_vs_expenditure_cuts.asp.

Charney, A. H. (2010b). 'Comparison of UA, REMI, and STAMP Simulations of Tax/Spending Increases.' March 30, 2010. Available at: http://ebr.eller.arizona.edu/research/articles/2010/compare_ua_remi_stamp_simulations.asp.

Charney, A. H. (2010c). 'Response to: Beacon Hill Institute's Tax Analysis Modeling Program: A Response to Charney.' May 6, 2010. Available at: http://ebr.eller.arizona.edu/arizona_fiscal_issues/response%20to%20Beacon_Hill_tax_modeling%20_program.aspx.

Charney, A. H., and M. J. Vest. (2003). 'Modeling Practices and Their Ability to Assess Tax/Expenditure Economic Impacts.' Paper prepared for the October 2003 AUBER Conference in New Orleans. Available at: http://ebr.eller.arizona.edu/research/TaxModelingPractices.pdf.

Chirinko, R. S., S. M. Fazzari, and A. P. Meyer. (2004). 'That elusive elasticity: a long-panel approach to estimating the capital-labor substitution elasticity.' CESifo working papers, No. 1240. Available at: http://www.econstor.eu/bitstream/10419/18879/1/cesifo1_wp1240.pdf.

Chirinko, R. S. (2008). 'σ: The Long and Short of It.' Journal of Macroeconomics, 30(2): 671-686.

Congressional Budget Office (CBO). (2012). 'How the Supply of Labor Responds to Changes in Fiscal Policy.' Available at: https://www.cbo.gov/sites/default/files/cbofiles/attachments/10-25-2012-Labor_Supply_and_Fiscal_Policy.pdf.

Devarajan, S., and S. Robinson. (2002). 'The Influence of Computable General Equilibrium Models on Policy.' International Food Policy Research Institute, Trade and Macroeconomics Division Discussion Paper No. 98. Available at: http://ageconsearch.umn.edu/bitstream/16267/1/tm020098.pdf.

Engen, E. (1997). 'Dynamic Tax Models: Why They Do The Things They Do.' National Tax Journal, 50(3), 657-682. Available at: http://ntj.tax.org/wwtax/ntjrec.nsf/0/a4ae09c03add63d385256863004a5949/$FILE/v50n3657.pdf.

Fox, T., and D. Fullerton. (1991). 'The irrelevance of detail in a computable general equilibrium model.' Economics Letters, 36: 67-70. Available at: http://works.bepress.com/don_fullerton/51/.

Ha, S. J., K. Turner, G. Hewings, P. McGregor, and J. K. Swales. (2010). 'Econometric estimation of Armington import elasticities and their system-wide impact in a regional CGE model of the Illinois economy.' Stirling Economics Discussion Paper 2010-19. University of Stirling Management School. Available at: https://dspace.stir.ac.uk/handle/1893/2707.

Hoffman, D., and T. Rex. (2009). 'The Economic Effects of Government Spending Reductions Relative to Other Options: A Report from the Office of the University Economist.' W.P. Carey School of Business, Arizona State University. Available at: http://wpcarey.asu.edu/seidman/reports/UnivEconomist/EconEffects_Feb09.pdf.

Johnson, L. T. (2013). 'Critiquing the Methodology of the Beacon Hill STAMP Model.' In White, S. W., C. Steger, and K. Narita, The Renewable Portfolio Standard Works for Kansas: Revealing the Distortion in the Kansas Beacon Hill Report, KEIN and NRDC. Available at: http://www.nrdc.org/energy/renewable-portfolio-standards/files/RPS-KS-rebuttal-IB.pdf.

Kirman, A. (1989). 'The Intrinsic Limits of Modern Economic Theory: The Emperor Has No Clothes.' The Economic Journal, 99(395): 126-139, Supplement: Conference Papers. Available at: https://server1.tepper.cmu.edu/Phd/GE/kirman.pdf.

Leachman, M., P. Oliff, and A. Heiman. (2012). 'North Dakota's Measure 2: High Risk for Little Reward.' Center on Budget and Policy Priorities. Available at: http://www.cbpp.org/cms/?fa=view&id=3776.

Leachman, M., M. Mazerov, V. Palacios, and C. Mai. (2013). 'State Personal Income Tax Cuts: A Poor Strategy for Economic Growth.' Center on Budget and Policy Priorities. Available at: http://www.cbpp.org/cms/?fa=view&id=3936.

Leachman, M., and C. Mai. (2014). 'Lessons for Other States from Kansas' Massive Tax Cuts.' Center on Budget and Policy Priorities. Available at: http://www.cbpp.org/cms/index.cfm?fa=view&id=4110.

Mazerov, M. (2013). 'Academic Research Lacks Consensus on the Impact of State Tax Cuts on Economic Growth.' Center on Budget and Policy Priorities. Available at: http://www.cbpp.org/cms/index.cfm?fa=view&id=3975.

McClelland, R., and S. Mok. (2012). 'A Review of Recent Research on Labor Supply Elasticities.' Congressional Budget Office Working Paper 2012-12. Available at: http://www.cbo.gov/sites/default/files/cbofiles/attachments/10-25-2012-Recent_Research_on_Labor_Supply_Elasticities.pdf.

Mitra-Kahn, B. H. (2008). 'Debunking the Myths of Computable General Equilibrium Models.' Schwartz Center for Economic Policy Analysis Working Paper 2008-1. Available at: http://www.newschool.edu/scepa/publications/workingpapers/SCEPA%20Working%20Paper%202008-1%20Kahn.pdf.

Reinert, K. A., and D. Roland-Holst. (1992). 'Armington Elasticities for United States Manufacturing Sectors.' Journal of Policy Modeling, 14(5): 631-639.

Roeger, W., J. I. T. Veld, and D. I. A. Woehrmann. (2002). 'Some Equity and Efficiency Considerations of International Tax Competition.' International Tax and Public Finance, 9(1): 7-31.

Roland-Holst, D. W., K. A. Reinert, and C. R. Shiells. (1994). 'A General Equilibrium Analysis of North American Economic Integration.' Modeling Trade Policy: Applied General Equilibrium Assessments of North American Free Trade. Cambridge University Press.

Stiglitz, J. E. (2000). 'The Contributions of the Economics of Information to Twentieth Century Economics.' The Quarterly Journal of Economics, 115(4): 1441-1478. Available at: http://ricardo.ecn.wfu.edu/~cottrell/papers/stiglitz.pdf.

Wing, I. S. (2004). 'Computable General Equilibrium Models and Their Use in Economy-Wide Policy Analysis.' MIT Joint Program on Science and Policy of Global Change, Technical Note No. 6. Available at: http://web.mit.edu/globalchange/www/MITJPSPGC_TechNote6.pdf.