



## **The Vermont Legislative Research Service**

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### **Regional Economic Modeling**

In the 1990s many states began using dynamic economic modeling which “attempts to predict changes in the economies brought about by changes in fiscal policies.”<sup>1</sup> Economic modeling can be used to evaluate the impacts of public policy and better understand how public sector actions affect the regional economy. In essence, this modeling can be used to test the economic impacts of a potential policy before implementing that policy. These models evaluate a number of policies including economic development, environmental, energy, transportation, taxation, forecasting, and planning.

An example of one of these models is REMI (Regional Economic Models, Inc). REMI lists on their website, four different methodological approaches they use to create their model: “input-output, general equilibrium, econometric, and economic geography.”<sup>2</sup> By using these modeling approaches REMI seeks to capture inter-industry relationships within a region, long-run potential impacts of policy changes, and spatial dimensions of the economy such as transportation costs and firm access to human capital.

REMI offers a model called “PI+” which can be used to simulate the effects of policy or structural changes in “economic development, infrastructure, environment, energy and natural resources; and state and local tax changes.”<sup>3</sup> Adam Fulton of REMI posits that dynamic economic modeling can be a valuable tool in terms of forecasting as well as impact assessment.<sup>4</sup> There are a number of states throughout the US using REMI models to review potential policy changes along with evaluating the impacts of legislation. REMI has an extensive list of clients, both private and public sector.<sup>5</sup> In the state of Vermont, REMI is

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<sup>1</sup> Arizona Joint Legislative Budget Committee, “Overview of Dynamic Revenue Forecasting,” Arizona Legislature, February 10, 2006, accessed March 15, 2015, <http://www.azleg.gov/jlbc/m-RevForecasting.pdf>.

<sup>2</sup> REMI, “The REMI Model,” January, 1, 2015, accessed March 6, 2015, <http://www.remi.com/the-remi-model>

<sup>3</sup> REMI, “PI,” January 1, 2012, accessed March 6, 2015, <http://www.remi.com/products/pi>.

<sup>4</sup> Adam Fulton (REMI) in discussion with the authors, March 10, 2015.

<sup>5</sup> REMI’s list of clients can be accessed here: <http://www.remi.com/clients>.

used by the Vermont Employment Growth Incentive program<sup>6</sup> and has been used by other various state departments in reports<sup>7</sup> to evaluate the impacts of potential economic changes along with state economic reviews.

### **Dynamic Modeling in Vermont**

After speaking to representatives from both the Statehouse and REMI, they recommended speaking to Tom Kavet, of Kavet, Rockler & Associates. Mr. Kavet is considered one of Vermont's foremost experts on the REMI model. In a phone interview conducted with Mr. Kavet, it was revealed that the most important part of the REMI modeling process is the research and effort to develop quality input data necessary to run the model. Mr. Kavet said, "98 percent of best practice REMI modeling is associated with research and developing high quality data inputs and model specifications,"<sup>8</sup> essentially, higher quality of inputs will yield higher quality results in the model. The example given about the importance of high quality inputs being critical to an accurate model was a consensus study conducted by Kavet, Rockler & Associates, LLC and Economic & Policy Resources, Inc., using REMI in the case of the shutdown of the Vermont Yankee power plant. The data to be used in specifying the model was developed via a consensus process over a sixteen month period by economic and energy experts, as well as state government and Vermont electric utilities officials. The primary purpose of this report was to develop a "general economic impact model that would allow future analyses of additional scenarios based on a variety of input assumptions."<sup>9</sup>

Mr. Kavet, when asked about using the model, said that it is important for the personnel running the model to be familiar with the specifics of each model application, as well as an expert with the model itself. This two-part requirement is important to avoid potential policy mistakes due to misuse and misinterpretation. He also said that an active relationship between users and REMI could result in an improved model and one more customized to the particular needs of the client and application. When asked about the REMI model in comparison to IMPLAN, another commonly used model, Mr. Kavet said that it [IMPLAN] is a useful model for those not able to afford REMI, but that it lacks many important components of the REMI model, including a time dimension, demographic detail, and behavioral econometric responses, to make a few. The IMPLAN model is cheaper, but not nearly as comprehensive, and thus not a substitute for REMI."<sup>10</sup> The REDYN model is the closest extant regional model that competes with REMI for more sophisticated analyses, but REDYN has not always been updated in a timely manner and does not offer the same level of model and customer applications support.

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<sup>6</sup> Agency of Commerce & Community Development, "Vermont Employment Growth Incentive (VEGI)," 2015, accessed March 7, 2015, <http://accd.vermont.gov/business/start/vegi>.

<sup>7</sup> Example reports for Vermont: <http://www.leg.state.vt.us/jfo/envy/Economic%20Analysis%20-%20Executive%20Summary10.pdf> and <http://www.kavetrockler.com/pdf/F0112%20Commentary.pdf>

<sup>8</sup> Thomas Kavet (Rockler and Kavet), in discussion with author, March 12, 2015.

<sup>9</sup> Economic & Policy Resources, Inc., Kavet, Rockler & Associates, LLC, "Consensus Economic and Fiscal Impact Analyses Associated with the Future of the Vermont Yankee Power Plant," March 2010, <http://www.leg.state.vt.us/jfo/envy/Economic%20Analysis%20-%20Executive%20Summary10.pdf>.

<sup>10</sup> Thomas Kavet (Kavet, Rockler & Associates, LLC) in discussion with author, March 12, 2015.

According to Mr. Kavet, Vermont currently uses REMI modeling for programs like the Vermont Employment Growth Incentive (VEGI). The VEGI program is intended to create jobs and expand Vermont based businesses through cash payments to private companies. For VEGI, the state uses REMI to create cost-benefit analyses of state investment in a private company. A critical flaw in using REMI for the VEGI program is the assumption in the REMI model that companies would not create these jobs without the government investment.<sup>11</sup> This assumption overestimates the benefits of government investment in these private companies. Without any modeling, however, it is difficult to have any idea of the impact the government investment has. One of the major benefits of economic modeling is the research that is needed to establish the parameters of the model. The model requires precise and detailed information about the economy of region; this information in itself can be extremely helpful for informing policy. The results of the model, if run correctly, can provide information on the impact of the policy and the potential affects that a policy has on the larger economy.

### **Limitations of the Model**

In an article titled, “The Misuse of Regional Economic Models,” from the 1993 *Cato Journal* (The Cato Institute is a libertarian think tank located in Washington, D.C.), author Edwin Mills talks about the potential benefits and shortcomings of the REMI model. Mills opens his article by praising the customizability of the REMI model, specifically the “most detailed version” which, at the time used 49 private production sectors<sup>12</sup> (169 today<sup>13</sup>). This means that the model can be adjusted in many different ways to look into the problem at hand.

One shortcoming of the model that Mills cites later in his article is the tendency of REMI models to overestimate the public benefit of government projects. He states that this overestimate tends to come from incomplete modeling of the government sector,<sup>14</sup> specifically that of budget constraints. This means that changes in taxes, or budgetary shifts, to finance a project are not necessarily accounted for in the model without additional input from the user. As a result, the model may not precisely predict the total net impact on the studied project.

While the inclusion of the viewpoints from the Cato Journal might seem to introduce bias into the research, the VLRS team thought it important to include an organization that would try to present the most problems with REMI. After careful consideration of Mills’ concepts, REMI was contacted for a chance to reply and challenge the findings. In email contact with Chris Brown of REMI, he acknowledged that the model does not automatically force a balanced budget when cutting or increasing taxes. Therefore, there are opportunities for misuse of the model if the user does not account for a balanced budget.

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<sup>11</sup> Thomas Kavet (Kavet, Rockler & Associates) in discussion with the authors, March 12, 2015.

<sup>12</sup> Edwin S. Mills, “The Misuse of Regional Economic Models,” *Cato Journal* Vol. 13 (1993) 30.

<sup>13</sup> REMI, REMI Policy Insight User Guide, “Industries in REMI Policy Insight,” Version 9.5, accessed March 30, 2015, <http://www.deq.state.or.us/aq/committees/docs/lcfs/itemEsectors.pdf>.

<sup>14</sup> Mills, “Regional Economic Models,” 35.

The model, however, does include numerous policy variables that can be included in the input to represent different ways to balance the budget. Various states have been implementing the Tax-PI model and the PI+ model in a transparent manner that accounts for both taxes and spending.<sup>15</sup> When trying to predict future outcomes and changes in government budgets, the inclusion of a “forced” balanced budget in the model could also yield inaccurate results.

The model’s goal is to forecast future economic impacts of a policy. Due to the modeler’s lack of knowledge of the future budget as a whole, it is impossible to perfectly model the policy impact on the budget in the coming years. If the modeler uses the REMI public sector variables and is transparent with the assumptions she or he has made on how the budget will be balanced, then results of the model are the best forecast of policy impact.

## State Experiences

### California

With the assistance of outside consultants, the California Department of Finance developed the Dynamic Revenue Analysis Model (DRAM) in the mid-1990s. Legislation passed in 1994 required the use of dynamic revenue estimates for tax law changes with a static impact of more than \$10 million. The legislation that required dynamic scoring expired in 2000, and the staff discontinued producing dynamic estimates in 2002.<sup>16</sup> The model discontinued because it was expensive and difficult to maintain, key personnel left the agency and were not replaced, and the results were not sufficiently different from static analyses. Senate Bill 617 of 2011 requires state agencies to conduct a “Standardized Regulatory Impact Assessment (SRIA) when it estimates that a proposed regulation has an economic impact exceeding \$50 million.” The law provides clear path for the use of economic modeling during the regulation process.<sup>17</sup>

### Florida

In 2010, Senate Bill 1178 was passed to create an evaluation process for dynamic analysis on new legislation. The office of Economic and Demographic Research (EDR) was charged with the task of developing the “protocols and procedures to be used by the consensus estimating conferences when evaluating proposed legislation,”<sup>18</sup> This bill gives authorization to the President of the Senate or the Speaker of the House of Representatives to request dynamic analysis on proposed legislation. The EDR worked with REMI to create a tax PI model for the state.<sup>19</sup> The state also uses other economic analyses to compare the results of REMI’s model with their own model. The EDR has contracts with REMI along with

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<sup>15</sup> Chris Brown (REMI) in email communication with authors, March 30, 2015.

<sup>16</sup> Arizona Joint Legislative Budget Committee, “Overview of Dynamic Revenue Forecasting.”

<sup>17</sup> “Major Regulation Senate Bill 617,” California Department of Finance, accessed March 20, 2015, 2013, [http://www.dof.ca.gov/research/economic\\_research\\_unit/SB617\\_regulation/view.php](http://www.dof.ca.gov/research/economic_research_unit/SB617_regulation/view.php).

<sup>18</sup> Florida Legislature, “Florida S1178 | 2010 | Regular Session,” LegiScan, May 27, 2010, accessed March 15, 2015. <https://legiscan.com/FL/bill/S1178/2010>.

<sup>19</sup> Chris Brown (REMI) in discussion with authors, March 3, 2015.

another contractor who has experience with these types of economic models to assist in the development of the Florida specific model.<sup>20</sup>

## **New Hampshire**

New Hampshire currently uses REMI modeling in a similar manner to Vermont. The REMI website only lists the New Hampshire Department of Employment Security as one of their clients.<sup>21</sup> The model has been used in the state to provide accurate information for the lobbying of proposed projects, ranging from a study into installing scrubbers (air pollution control devices) at the Merrimack [power] Station<sup>22</sup> to a study looking at the economic impacts of The Northern Pass Transmission Project.<sup>23</sup> In both of these cases, the model was run by a third party (Gallagher, Callahan & Gartrell) for the companies lobbying for the projects. Both of these studies used REMI to look at the economic benefits to the state, including employment benefits. In Shapiro's study of The Northern Pass Transmission Project, the preliminary research into employment was conducted using the RIMS II model (a static model compared to REMI's dynamic model). The REMI model used in this study expanded on the preliminary RIMS II forecast by allowing the job forecasts to be broken down by sector, over a period of time.<sup>24</sup> In the instance of this project, the proposed expenditure was about \$200 million. The cost of the Merrimack [power] Station scrubber project was \$457 million when it passed in 2006.<sup>25</sup>

## **Texas**

In Texas, the Revenue Estimating Division of the Office of the Comptroller of Public Accounts regularly uses dynamic analyses to model tax law changes. The office uses models that estimate the budgetary impacts of possible tax changes having "a static estimated cost exceeding \$100 million." The model in Texas has some variation from other states because Texas does not have a state income tax and the majority of their revenue comes from sales and use taxes. As a result, their model is customized to take this into account as sales taxes and income taxes are treated similarly in REMI models.<sup>26</sup> Their work has been focused on

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<sup>20</sup> "Statewide Policy Analysis Tools," Office of Economic & Demographic Resource. November 8, 2012, accessed March 15, 2015, <http://edr.state.fl.us/Content/statewide-policy-analysis-tools/index.cfm>.

<sup>21</sup> REMI's list of clients can be accessed here: <http://www.remi.com/clients>.

<sup>22</sup> Lisa Shapiro and Heidi Kroll, Gallagher, Callahan & Gartrell, PC., "Economic Impacts of Constructing a Scrubber at Merrimack Station," March 13, 2009, <http://www.gcglaw.com/resources/economic/pdfs/scrubber.pdf>.

<sup>23</sup> Lisa Shapiro, Gallagher, Callahan & Gartrell, PC., "Proposed Northern Pass Transmission Project Economic Impact Update Estimated New Hampshire Jobs During 3 Year Construction Phase," April 2011, [http://northernpass.us/assets/permits-and-approvals/Job\\_Impact\\_Study\\_April\\_2011.pdf](http://northernpass.us/assets/permits-and-approvals/Job_Impact_Study_April_2011.pdf).

<sup>24</sup> Shapiro, "Northern Pass."

<sup>25</sup> Shapiro and Kroll, "Merrimack Station."

<sup>26</sup> Mickey Hepner and W. Robert Reed, "Dynamic Scoring in the Public and Private Sectors: Final Report," World Council on Economic Policy for The Heritage Foundation, March 21, 2003, accessed March 19<sup>th</sup>, 2015.

analyzing “offsetting tax changes.”<sup>27</sup> The office has also analyzed the economic impacts of Fort Bliss, Fort Hood, and the Red River Army Depot.<sup>28</sup>

## Conclusion

Using REMI models, or any economic modeling, can provide valuable information on cost-benefit and impact analysis of different policies. The model can provide credible results when used properly. There are critiques of the REMI modeling system, however, the consensus in the research is that if the model inputs are high quality and the user the of the model understands the assumptions of the model, then the results can be an accurate prediction of the impact of a policy change. It is not possible to find high quality inputs for every introduced policy, but the model should not be run without adequate research. Different states vary widely in the their use of the model because of the large cost in acquiring precise data and running the model. Thus, states with large budgets tend to use the model more often. In the case of Vermont, as can be seen in the Vermont Yankee report, compiled by Kavet, Rockler & Associates, when all of the steps are taken to ensure good research, and understand the limitations of the model, the output can be a valuable tool in informing the legislative process.

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This report was completed on April 28, 2015 by Jon Gonin, Matthew Donovan, and Becca Brolinson under the supervision of Professors Jack Gierzynski, Robert Bartlett and Eileen Burgin in response to a request from Representative Scheuermann.

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Disclaimer: This report has been compiled by undergraduate students at the University of Vermont under the supervision of Professor Anthony Jack Gierzynski, Professor Robert Bartlett and Professor Eileen Burgin. The material contained in the report does not reflect the official policy of the University of Vermont.

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<sup>27</sup> Arizona Joint Legislative Budget Committee, “Overview of Dynamic Revenue Forecasting.”

<sup>28</sup> Example reports for Texas: [http://thetexasconomy.org/economic-outlook/economy/media/RedRiverAD\\_2012.pdf](http://thetexasconomy.org/economic-outlook/economy/media/RedRiverAD_2012.pdf) and [http://thetexasconomy.org/economic-outlook/economy/media/FortHood\\_2012.pdf](http://thetexasconomy.org/economic-outlook/economy/media/FortHood_2012.pdf).