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MEMORANDUM

NEW ENGLAND PUBLIC POLICY CENTER

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To: Senator Douglas Smith
Cc: Mr. Andrew Worcester
From: Robert Tannenwald, Director
Re: Fiscal Note on LD 569
Date: March 28, 2007

You requested an evaluation of the revenue estimate reported in the Fiscal Note on LD 569, a bill that would cut Maine's personal and corporate income taxes by 50 percent, beginning in the 2007 tax year. This memo explains why the estimated revenue cost drops in the second year from approximately $823 million to $649 million and comments on how "feedback" effects might be taken into account in estimating the fiscal impact of the proposed legislation.

The legislation's estimated cost is so much larger in FY08 compared to FY09 because the proposed tax cuts would be retroactive to January 1, 2007. Consequently, 18 months worth of tax reduction would be packed into the 12 months of FY08. The impact of such retroactivity would disappear in FY09.

As the Fiscal Note accompanying the bill points out, the revenue cost of the proposed legislation could be considerably smaller to the extent that, as a result of the tax cuts, income taxpayers become subject to Maine's alternative minimum tax (AMT). To the extent that the AMT comes into play, the proposed legislation would not entail a tax cut. Rather, it would simply cause some taxpayers to be subject to a different tax regime, one that would be at least as burdensome as the one that applies under current law.

Even if Maine Revenue Services incorporated possible "feedback effects" into its revenue estimating model, it would have to first know how the proposed tax cuts would be financed in order to produce a "dynamic" revenue estimate. Just as tax cuts generate feedback effects, so does government spending. If the tax cuts were financed by concomitant reductions in public expenditures, it is not clear which effect would be larger. In theory, the net effect could be zero, or even negative—that is, the deleterious effects of the spending reduction on the economy could outweigh the positive effects of the tax cuts. Empirical evidence suggests that tax cuts financed by reductions in transfer payments stimulate the economy more than tax cuts financed by reductions in outlays for infrastructure, schools, and public safety.

Several states have experimented with dynamic revenue estimating techniques over the past 15 years. According to an analysis performed by the Heritage Foundation in 2003 (which accompanies this memo), 10 states employed some form of dynamic revenue estimation

technique at that time. Of these, five used the regional model constructed by Regional Econometric Modeling, Inc. (REMI). The survey did not discuss the size of the feedback effects found by state estimators employing this and other models.

In order to learn more about the results of these models, I called James Alt of the Federation of Tax Administrators while preparing this memo. As a long-time, experienced tax researcher and perennial organizer of the Federation's annual tax research conference, he is quite familiar with revenue estimating techniques and results across the 50 states. According to Mr. Alt, dynamic estimates of revenue losses resulting from income tax cuts range from 0 to 20 percent, depending on their structure and how they are financed. As noted above, these effects take a long time to materialize.

In evaluating any dynamic revenue estimate, one should identify and carefully evaluate the core assumptions that underpin it and potential sources of bias.

Please let me know if the New England Public Policy Center can be of further assistance.

DYNAMIC SCORING IN THE PUBLIC AND PRIVATE SECTORS:

FINAL REPORT

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I. Introduction

Dynamic scoring refers to the practice of incorporating "feedback effects" when estimating the budgetary impacts of fiscal policy. For example, the Bush Administration is proposing large tax cuts to stimulate the economy. However, the federal government currently does not include estimates of the stimulatory effect of these tax cuts when calculating their budgetary consequences.

This study examines the prevalence of dynamic scoring practices amongst state governments. We survey each of the fifty states to determine whether they currently employ dynamic scoring when estimating the budgetary consequences of state fiscal policy. In addition, we survey a small set of firms in the private sector to determine if they use "dynamic scoring-like" practices in their forecasts of revenue and product demand.

The study proceeds as follows. Section II briefly summarizes the debate concerning dynamic scoring. Section III presents the results of our survey of state governments. Section IV presents the results of our survey of corporations. Section V concludes.

II. A Brief Summary of the Dynamic Scoring Debate

When policymakers wish to compare the effects of alternative policies, they need to have a complete enumeration of the benefits and costs of each proposal. Since new policies often create new behavioral incentives, a cost/benefit analysis necessarily includes an understanding of how individuals and organizations will respond to each policy. Currently, the Congressional Budget Office (CBO) and the Joint Committee on

Taxation (JCT) only partially adjust for these new incentives by incorporating microeconomic responses but ignoring any macroeconomic response. For example, if a new savings tax credit is proposed, CBO and JCT, while calculating the budgetary implications, would consider the idea that under the proposal individuals will have greater incentives to save and will consequently save more. However, CBO and JCT will not consider the macroeconomic effects of additional personal savings. If these additional savings promote investment and economic growth – thereby increasing long-term income tax collections – then the CBO and JCT estimates will overstate any long-term budgetary costs and understate the potential benefits. This shortcoming has led many economists and policymakers to urge CBO and JCT to employ "dynamic scoring" techniques to incorporate the macroeconomic effects of proposed policies in budget calculations[1].

Unfortunately, compared to static scoring, the use of dynamic scoring requires more complicated economic models to capture the feedback effects on the different sectors in the economy. In order to be successful therefore, practitioners need more expertise with forecasting models, and more time to prepare the estimates. These two factors significantly increase the cost (in terms of required resources) of scoring budgetary impacts, thereby leading some observers to claim that any use of dynamic scoring would result in more unreliable and/or less timely budgetary estimates[2].

The debate over dynamic scoring is not limited to the CBO and JCT, however. The American Legislative Exchange Council (ALEC) actively promotes the use of dynamic scoring for state-level budgeting[3] despite the presence of balanced budget

[1] Kevin Hassett, "Statement on Dynamic Scoring to the United States House of Representatives Budget Committee", May 2, 2002.
[2] Sen. Tom Daschle and Sen. Kent Conrad, "Letter to the Joint Committee on Taxation", June 25, 2002.
[3] American Legislative Exchange Council, "Dynamic Scoring: Forecasting in the Real World", 2002.

requirements in most states. On the other hand, the federal government is under no such constraint. These state-level, balanced budget requirements force state policymakers to focus more attention on immediate budgetary impacts, with less focus on any long-term implications. Since dynamic scoring helps policymakers calculate long-term effects of policy proposals, the technique may be less applicable for state-level policy than for federal policy. Since states may be less likely than the federal government to possess the necessary resources for dynamic scoring, and most states face balanced budget requirements, one might expect states to be more reluctant than federal officials to employ dynamic scoring.

Clearly the use of more complete forecasting techniques, and therefore more complete information, can be helpful to policymakers planning an organization's future. The additional information, however, comes with the cost of more required resources. One would expect that those organizations that can realize higher gains from the technique, ceteris paribus, will be more likely to employ dynamic scoring techniques. This study seeks to determine whether state governments and private industry use these dynamic scoring techniques to aid in the decision making process. Additionally, for the organizations that employ dynamic scoring, this study determines how those organizations use the techniques.

III. Results from the States

Methodology. The authors conducted a wide-ranging survey of officials from all fifty states. Since different states allocate the responsibility for estimating budgetary impacts across different institutions, the authors attempted to identify the proper agencies and individuals in each state who are responsible for estimating the budgetary impacts of

policy proposals. Generally, these responsible individuals worked within the budget divisions of either the executive or legislative branches. The individuals were contacted by phone and/or e-mail in late-February and early-March 2003. A list of individuals who were surveyed along with their contact information is provided in Table A-1 of the Appendix.

For each organization surveyed, the authors determined:

1. Whether dynamic scoring forecasting techniques are employed
2. The specific dynamic effects captured in the model
3. The techniques used to capture these effects

General Findings. TABLE I summarizes the survey results from the states. Forty of the fifty states do not employ dynamic scoring in their budget forecasts. Several of the state contacts responded that the cost of conducting dynamic analysis along with the specific balanced budget requirements within their states led them to choose not to employ dynamic scoring techniques.

On the other hand, ten states employ dynamic scoring techniques to some degree. While there is great disparity in terms of the complexity of analyses and the weights attached to dynamic scoring estimates, several general characteristics can be observed.

Interestingly, the list is dominated by states located in the southern and western United States, with four states from each region, respectively. Included in the list are the three most populous states in the country: California, Texas, and New York. Compared to most smaller states these three states are more likely to possess the necessary resources required to engage in dynamic scoring.

Five out of the ten states report using the REMI econometric model developed by Regional Economic Models, Inc. The REMI model is designed to estimate the impact of policy changes on regional economies. According to company literature,

> "The forecasting and policy analysis system includes key econometric estimates and integrates inter-industry transactions, long-run equilibrium features, and the new economic geography. It includes: substitution among factors of production in response to changes in relative factor costs; migration responses to changes in expected income; labor participation rate responses to changes in real wage and employment conditions; wage rate responses to labor market changes; consumer consumption responses to changes in real disposable income and commodity prices; and local, regional, and market shares responses to changes in regional production costs and agglomeration economics."[4]

These effects – and others – determine the factors driving a region's economy including the levels of consumption, business investment, state and local government spending, and regional net exports. These factors in turn determine the level of regional economic output and employment. Finally, employment affects wages, prices, migration, and ultimately once again consumption, investment, state and local government spending, and regional net exports. Consequently, the REMI model utilizes dynamic feedback loops to capture the complex interrelationships within an economy.[5] Figure A-1 in the Appendix includes a schematic diagram of the REMI model illustrating the interrelationships among the various components of the model. Even though Arizona, Arkansas, Louisiana, Texas, and Wyoming all use the REMI model to estimate dynamic effects, each state implements the model in unique ways.

[4] "REMI Model Overview", 2003, Regional Economic Models, Inc. http://www.remi.com/ .
[5] "REMI Model Structure", 2003, Regional Economic Models, Inc. http://www.remi.com/ .

The five remaining states – California, Georgia, New York, Oregon, and West Virginia – utilize models unique to their state. The differences among the ten states are highlighted in the state-by-state analysis below.

Arizona. In Arizona the Joint Legislative Budget Committee (JLBC) is charged with preparing the Fiscal Notes detailing the budgetary impacts of policy proposals. Until recently the JLBC staff would prepare a static estimate of any budgetary impacts. Legislation enacted in 2002, however, requires the JLBC Staff to include the "probable behavioral response" to the Fiscal Notes along with the static estimate the staff currently provides. In the past, the staff has acknowledged the existence of secondary, dynamic effects, but has generally not attempted to quantify them.

In January 2003, the JLBC entered into a secondary user license with REMI and the Arizona Department of Commerce for the purposes of satisfying the new legal requirement to estimate the dynamic effects of legislation. Because of the newness of the legislation the policies and procedures surrounding the requirements are still evolving. Generally, the JLBC staff expects the analysis will only be performed for proposals that generate substantial budgetary impacts.

Proposals generating substantial budgetary impacts in Arizona most likely will involve the sales and use taxes, individual income taxes, or corporate income taxes since these taxes make up the vast majority of tax revenues. Arizona receives 48% of its General Fund revenue through its sales (Transactions Privilege Tax) and use taxes, 33% from individual income taxes, and 6% from corporate income taxes[6]. The REMI model treats sales taxes similarly to an increase in consumer prices, thereby indirectly influencing consumer spending and employment. The model treats income taxes as a

[6] State of Arizona Joint Legislative Budget Committee, "2002 Tax Handbook".

decrease in disposable income, indirectly affecting consumer spending and employment. Finally, the model treats corporate income and business taxes similarly to an increase in the cost of capital. This implicit increase in the cost of capital impacts both investment and production costs indirectly modifying employment.[7]

Arizona. In Arkansas the Office of Economic Analysis and Tax Research (OEATR), a division of the Department of Finance and Administration within the executive branch, estimates the budgetary impact of policy proposals. These estimates incorporate a dynamic component whenever the OEATR believes that the proposal could generate significant dynamic feedbacks. In order to capture these effects, the OEATR uses the REMI model.

As with Arizona, proposals generating significant dynamic feedbacks in Arkansas most likely will involve the sales and use taxes, individual income taxes, or corporate income taxes, because these taxes are the major sources of tax revenue. Last fiscal year Arkansas received 43% of its General Fund revenue through its sales and use taxes, 45% from individual income taxes, and 6% from corporate income and franchise taxes[8]. The REMI model treats sales taxes similarly to an increase in consumer prices, thereby indirectly influencing consumer spending and employment. The model treats income taxes as a decrease in disposable income, indirectly affecting consumer spending and employment. Finally, the model treats corporate income and business taxes similarly to

[7] "Taxation, Budget, and Welfare Decisions Using Economic Models", 2003, Regional Economic Models, Inc. http://www.remi.com/ .
[8] State of Arkansas Department of Finance and Administration, *Arkansas Fiscal Notes*, vol. 15, no.12, June 2002.

an increase in the cost of capital. This implicitly higher cost of capital impacts both investment and production costs indirectly modifying employment.[9]

California. In California, the Department of Finance (DOF) is charged with estimating the fiscal impact of proposed legislation. Whenever the estimated static fiscal impact of a proposal exceeds $10 million the DOF must perform a dynamic analysis using California's proprietary Dynamic Revenue Analysis Model (DRAM). DRAM, developed by California economists in the 1990's is an example of a "computable general equilibrium" (CGE) model.

CGE models use a set of equations (the California model consists of approximately 1100 equations) to model the behavior of consumers, firms, and government across input and output markets. The model specifies the supply and demand for each of these markets and computes the market-clearing prices and quantities in each market. Thus, wages (the price of labor) and employment (the quantity of labor) are some of the outputs determined by the model. The reliance on market-clearing prices however, is the principal difference between the CGE models and the REMI models. REMI models do not assume that all input and output markets necessarily clear. Consequently, the CGE models impose more structure on the behavior of consumers, firms, and government.

Other than the market-clearing assumption, California's CGE model and the REMI model have similar structures. The California model includes sectors modeling consumer spending, investment, government spending and taxes, trade, labor and capital markets, and migration. In the model, personal income taxes influence disposable income, sales taxes increase the effective prices paid by consumers, and corporate income

[9] "Taxation, Budget, and Welfare Decisions Using Economic Models", 2003, Regional Economic Models, Inc. http://www.remi.com/ .

taxes influence the implicit cost of capital.[10] These taxes comprise over 80% of California's tax revenue. California generally receives approximately 46% of its General Fund revenue from its personal income tax, 30% from sales and use taxes, and 7% from corporate income taxes.[11]

Georgia. In Georgia, the Governor and his staff are responsible for making official revenue estimates. He is assisted in this responsibility by a state economist, Henry Thomassen, under contract as a consultant with the Governor's Office of Planning and Budget, which manages the budget for the Governor. The basis for making revenue projections is an econometric model developed and managed by the state economist.

The proprietary model consists of approximately 50 equations, many of which are identities, but is regularly modified by adding and deleting equations when appropriate. The model only includes equations relevant to the problem being addressed and in which Dr. Thomassen is confident. He believes this framework is more beneficial than a standard REMI model as he can develop a model that more accurately reflects the idiosyncrasies of the Georgia economy. According to Dr. Thomassen, the model can be used to estimate dynamic impacts of changes to income (individual and corporate) and sales taxes. Georgia generally receives approximately 31% of its General Fund revenue through its sales taxes, and 49% from individual and corporate income taxes[12]. Interestingly, the dynamic effects of most business taxes – and the subsequent implicit

[10] P. Berck, E. Golan, and B. Smith. 1996. "Dynamic Revenue Analysis for California". California Department of Finance http://www.dof.ca.gov/ .
[11] State of California, Governor's Budget Summary 2003-2004.
[12] State of Georgia, "Governor's Budget Report: FY 2003".

increase in the cost of capital – are not captured by the model as Dr. Thomassen is not confident the dynamic effects can be properly identified with Georgia data.

Louisiana. In Louisiana the Legislative Fiscal Office is responsible for preparing estimates of the budgetary effects of policy proposals. Historically, Louisiana has not attempted to estimate any macroeconomic dynamic effects. However, the Legislative Fiscal Office has recently begun using a REMI model to unofficially consider these effects when analyzing some popular "large tax reduction ideas". Among the proposals being considered are a reduction in corporate franchise taxes (a $100+ million tax reduction) and excluding some machinery from sales taxes. The results of these studies, while not part of the "official" budget impact statements, are reported to the Louisiana Legislature where members can consider the results of the analysis.

The Legislative Fiscal Office indicates that future analysis will be limited to those proposals generating substantial budgetary impacts. Those proposals will likely involve changes in the sales and use taxes, individual income taxes, or corporate taxes, since they are the largest sources of tax revenue. Louisiana receives approximately 40% of its General Fund revenue through its sales taxes, 30% from individual income taxes, and 9% from corporate income and franchise taxes[13]. The REMI model treats sales taxes similarly to an increase in consumer prices, thereby influencing consumer spending and employment. The model treats income taxes as a decrease in disposable income, affecting consumer spending and employment. Finally, the model treats corporate income and

[13] State of Louisiana, "Executive Budget FY 2002-2003".

business taxes similarly to an increase in the cost of capital. The implicit increase in the cost of capital impacts both investment and production costs modifying employment.[14]

New York. In New York, the Economics/Revenue Unit within the Division of Budget is responsible for conducing economic analysis and estimating the fiscal impact of policy proposals, although there is no statutory requirement for the estimates to be based upon dynamic scoring techniques. To complete these tasks the Economics/Revenue Unit employs a variety of internally developed economic models. The Unit performs a dynamic analysis whenever such analysis is believed to be relevant – generally for very major tax changes.

The models used in New York have several components which can be integrated or used separately depending on the problem being addressed. One piece of the model forecasts the performance of the national economy. The national model feeds into a model of the New York economy predicting incomes, investment, production, and government spending. Finally, the distributional impacts of any legislation on individuals are also estimated with a microsimulation model.

The Economics/Revenue Unit indicates that future analyses will likely be limited to proposals generating substantial budgetary impacts. These proposals will likely involve changes in the sales and use taxes, individual income taxes, or corporate taxes since these taxes are the largest sources of revenue for the state. New York receives approximately 25% of its General Fund revenue through its sales taxes (this includes

[14] "Taxation, Budget, and Welfare Decisions Using Economic Models", 2003, Regional Economic Models, Inc. http://www.remi.com/ .

alcohol, tobacco, and gasoline taxes), 53% from individual income taxes, and 10% from business taxes[15].

Oregon. In Oregon, the Legislative Revenue Office is charged with preparing fiscal impact statements for policy proposals. For policy proposals with an annual estimated impact greater than $10 million, the Legislative Revenue Office uses the Oregon Tax Incidence Model (OTIM) to estimate dynamic effects. Like California's DRAM, OTIM is a dynamic computable general equilibrium (CGE) model designed to capture dynamic feedback effects across different sectors of the Oregon economy. The model was developed by economists at Oregon State University in conjunction with staff at the Legislative Revenue Office.

Like other CGE models the OTIM model uses a set of equations to model the behavior of consumers, firms, and government across input and output markets. The model specifies the supply and demand for each of these markets and computes the market-clearing prices and quantities in each market. Thus, wages (the price of labor) and employment (the quantity of labor) are some of the outputs determined by the model. The OTIM model divides the Oregon economy into 101 sectors including "29 industrial sectors, two resource sectors (labor and capital), 8 household sectors, one investment sector, 69 government sectors, and one sector that represents the rest of the world. The government sector is the most detailed in OTIM because of its focus on the impact of state government policy".[16]

The Legislative Revenue Office indicates that future analysis will be limited to those proposals generating substantial budgetary impacts. Those proposals will likely

[15] State of New York, "Executive Budget FY 2003-2004".
[16] Legislative Revenue Office, "The Oregon Tax Incidence Model" 2001.

involve changes in personal income taxes or corporate excise and income taxes since these taxes are the largest sources of revenue for the state. Oregon receives approximately 86% of its General Fund revenue through its personal income taxes, and 7% from corporate excise and income taxes.[17]

Texas. In Texas the Revenue Estimating Division, a division of the Office of the Comptroller, estimates the budgetary impact of policy proposals that have a static estimated cost exceeding $100 million. In order to capture any dynamic effects resulting from a large tax/revenue change, the Division uses a REMI model. The Texas REMI model differs from the model used in other states, however, because Texas does not have an income tax. Texas collects 55% of its tax revenues from its sales and use taxes, 22% from motor fuel and vehicle taxes (motor fuel – 11% and motor vehicle – 11%), and 8% from a corporate franchise tax.[18]

Within the REMI model, income and sales taxes have similar effects. Income taxes decrease disposable income, and therefore decrease consumption. Sales taxes are modeled as an increase in prices paid by buyers, resulting in an effectively lower real wage. The lower real wage also translates into decreased consumption. The major difference between income and sales taxes is that income taxes tax savings and spending, while sales taxes only tax spending. Consequently, one might expect to notice an increase in savings in a state like Texas that does not have an income tax. On a national scale the higher level of savings tends to put downward pressure on interest rates. However, in a REMI state model, interest rates are determined exogenously. Consequently, the effect of higher savings on economic growth is limited in the REMI framework.

[17] State of Oregon, "Governor's Balanced Budget FY 2003-2005".
[18] Texas Office of the Comptroller, "An Overview of the Texas Tax System" 2003.

West Virginia. For significant tax change proposals, West Virginia's Department of Tax and Revenue considers the dynamic effects that result. However, due to the lack of resources, the calculations are made without a formal econometric model. Analysts generally rely on historical experience when determining the level of any dynamic effect, with a tendency to err on the side of caution. The Department of Tax and Revenue emphasized that previous large tax cuts in West Virginia have been followed within a few years by offsetting tax increases, as officials originally understated the revenue loss. Consequently, West Virginia officials currently prefer to overstate potential revenue losses.

Wyoming. In Wyoming the Economic Analysis Division, a division of the Department of Administration and Information, sometimes is requested to estimate the budgetary effects of policy proposals. When asked to perform an economic analysis, the Economic Analysis Division estimates the dynamic effects with a REMI model. Like Texas, Wyoming does not have an income tax so it relies heavily on other sources of revenue. Wyoming collects approximately 50% of its general fund revenues from sales and use taxes, and another 18% from severance taxes[19]. Consequently, Wyoming's REMI model must reflect these unique characteristics of the Wyoming economy.

In 2001 the Economic Analysis Division used the REMI model to evaluate a proposed increase in the coal severance tax rate. The model indicated that higher severance taxes result in more government revenues and therefore more government spending. However, the model also indicated that the higher production costs would decrease private production, employment, and personal income throughout the state. Consequently, opponents armed with the REMI results defeated the tax proposal.

[19] State of Wyoming Consensus Revenue Estimating Group, "FY 2003 Forecast".

IV. Results from Individual Firms

Methodology. This section reports the results of a survey of a small set of corporations from the private sector. While an effort was made to survey firms across a number of different industries, the sample is too small to constitute a representative sampling of industry practices. Contact names, and in some cases, names of corporations have been kept confidential at the request of the survey responders. For each corporation surveyed, the authors determined:

1. Whether formal models were used to calculate the revenue and product demand impacts of corporate price decisions
2. Whether the effects of federal and/or state taxes were incorporated in the forecasting models

Not surprisingly, survey results varied widely across corporations. Results for each firm are presented below.

BellSouth Corporation. BellSouth Corporation is one of the largest communications companies in the country and a member of the Fortune 100. It is headquartered in Atlanta, Georgia and has business operations in a wide range of telecommunication services, including traditional telephone services, wireless communications, DSL, cable and digital TV. The company serves approximately 44 million consumers in the U.S. (primarily in the Southeast) and in 14 other countries.

BellSouth relies heavily on forecasting in its strategic planning. In particular, the impact of firm pricing decisions are incorporated within large, econometric models to determine the feedback effects of those decisions on product revenues. Most of this analysis is done in-house.

Taxes play a large role in BellSouth's forecasting. It is estimated that when all

sources are included, taxes account for approximately 35 percent of the company's revenues. Accordingly, changes in taxes have important consequences for the financial well-being of the company. Of particular importance for forecasting purposes are "universal service" charges. In addition to their direct effect on consumer demand, these charges generate price wedges between alternative telecom products.

For example, DSL is subject to "universal service" charges, while traditional dial-up internet services are not. Hence "universal service" charges generate indirect, cross-price feedback effects in addition to their direct effects on demand. BellSouth incorporates both own- and cross-price elasticities in their revenue forecasts. In other words, BellSouth uses sophisticated econometric modeling that incorporates the impact that changes in taxes (particularly "universal service" charges) have on DSL demand.

A large motor vehicle producer. This company is one of the world's largest producers of motor vehicles. It is a top 10 "Global 500" firm, as ranked by Fortune magazine. It has annual revenues greater than $100 billion and employs over 100,000 workers worldwide. It offers a wide selection of vehicle brands and models and has sales in many countries. This survey refers specifically to its North American forecasting operations.

This company's strategic planning unit consists of hundreds of employees. Approximately 20-30 analysts are employed full-time in formal, econometric modeling. There are three major forecasting units within the firm. The short-term forecast unit considers time horizons of 12 to 24 months. The long-term forecasting unit forecasts out 2 to 10 years. In addition, there is a unit that focuses on industry and market segment forecasting. This latter unit is concerned with forecasting macroeconomic variables for

the purpose of predicting industry sales volume. Analysts from the short-term and long-term units work with these industry projections to derive market demand for the company's specific brands and models.

Price is an important component in both short- and long-term forecasting. In the short-term, particular attention is placed on the effect of special buyer incentive packages. In the long-term, price elasticities are calculated for individual vehicles and market segments. These price elasticities are considered to be an important determinant of company sales. In other words, the company recognizes that changes in prices have important feedback effects on company sales volume.

The effects of taxes are generally not separately estimated. However, the company's most frequent measure of price--"average transaction price"--incorporates the effect of relevant state and federal taxes. Thus, increases in average transaction price due to higher federal and state taxes are viewed as having the same effect as increases in company invoice prices. There is an important exception to this general treatment of taxes: Some vehicle models are subject to "luxury" and/or "gas guzzler" taxes. These taxes are included as separate determinants of sales volume and have been found to have a measurable effect for some models.

American Electric Power. American Electric Power (AEP) is a Fortune 100 firm and is one of the largest energy producers in the world. It has four, core energy-related businesses: (i) power generation (it is the largest electricity producer in the United States); (ii) natural gas pipelines and storage; (iii) coal mining and transportation; and (iv) trading and marketing of pollution emissions. It serves about 5 million customers in the

U.S. (primarily in the Midwest, South, and Southeast), and another 2.4 million customers in foreign countries.

The company relies on a variety of techniques for forecasting demand in its regulated business units. Residential, commercial, industrial, other retail, and full-requirements wholesale markets are individually modelled. Short-term forecasts rely heavily on ARIMA time series techniques. In other words, future short-run demand is forecasted as a complex function of past demand. Economic variables are usually not employed in short-run forecasts. Longer term forecasts rely on forecast values of key economic fundamentals, such as population, employment, income, and industrial activity in a given area. Energy demand is derived from these larger indicators of economic activity.

Despite the fact that AEP has relatively large market share in a number of its markets, most of its forecasting models assume that energy demand is perfectly price inelastic; i.e., price changes are assumed not to have feedback effects on energy demand in either the short- or long-run. The only exception to this rule occurs in long-run forecasting of industrial and manufacturing energy demand. However, even here energy demand is generally estimated to be price inelastic. None of the demand forecasting models employed by AEP incorporate a role for taxes, either at the state or federal level.

OGE Energy Corporation. OGE Energy Corporation (OGE) is a regional energy company headquartered in Oklahoma. It has three main subsidiaries. OG&E Electric Services, a regulated electric utility company which serves approximately 700,000 customers in Oklahoma and Arkansas. Enogex, the natural gas arm of the company, is involved with the production and transportation of natural gas. And OGE

Energy Resources, which buys and sells energy in national commodity markets. The company is listed on the New York Stock Exchange.

Until the early 1990's, OGE did most of its forecasting in-house. Currently, the company contracts out its forecasting. OGE is concerned with forecasting both (i) total demand in terms of kilowatt-hours and (ii) peak demand. The latter is particularly important for determining capacity needs. As is common in the energy industry, the company segments its residential, commercial, and industrial markets for the purpose of forecasting energy demand.

Forecasts are based on economic models that derive energy demand as a function of population, income, employment, and weather, among other things. Predicted values for these fundamentals are then used to forecast energy demand. While price is a variable in these models, it rarely achieves statistical significance. This is consistent with the industry-wide view that energy demand, at least in the short-run, is price inelastic. Neither state nor federal taxes are included as explanatory variables in the company's forecasting models.

A large firm in the forest and paper products industry. This firm is one of the largest producers in the forest and paper products industry. It is a member of the Fortune 500. Its primary business operations consist of growing and harvesting trees, producing pulp and paper products, and developing real estate.

This company uses econometric modeling primarily for the purpose of forecasting prices in the industry. Forecasting consists primarily of identifying trends in national income, homebuilding, etc., which are then translated to industry price forecasts. The company then uses these price forecasts to make production decisions.

The fact that this company does not estimate price feedback effects should not be interpreted to say that price is not a significant determinant of industry demand. Despite its large size, this company views itself as a price-taker in the industry. Thus price is not a policy variable of the firm. As a result, the feedback effect of prices on demand is moot from the perspective of the firm's strategic planning.[20]

Taxes play a relatively small role in this company's revenue forecasts. In other words, changes in federal and/or state taxes are not viewed as having a large impact on the national variables upon which this company's price forecasts are based. There are exceptions. Currently, Canada and the U.S. are engaged in a "trade war" with respect to forest products. Tariffs on the order of 25 percent are placed on forest products that cross the border. These tariffs are viewed as having a significant impact on industry demand, and the company factors these effects into its forecasts. However, this is viewed as an unusual event in the industry.

V. Conclusion

What do the results of this survey contribute to the dynamic scoring debate? The short answer is that they provide a rebuttal to the argument that dynamic scoring cannot be used because it is too unreliable to be of practical use.

Ten of the fifty states, accounting for over a third of total national income and population, use some degree of dynamic scoring in their budget analyses. In a number of cases, the dynamic scoring estimates include the effects of taxes on "macroeconomic" variables, such as employment.

[20] The price forecasting that the firm undertakes should be thought of as "reduced form" estimation, where the national macroeconomic variables are viewed as exogenous determinants of industry price.

This is all the more noteworthy when one considers that all of these states are subject to balanced budget requirements of some sort. If dynamic scoring were a tool that led to fiscal crises, then one would expect states to abandon this technique as they faced the costly discipline of subsequent budget balancing.

This argument is reinforced when one considers the results of our private sector survey. While the small number of firms represented in this survey make it impossible to draw broad generalizations, it is clear that private sector corporations consider dynamic forecasting to be an important component of strategic planning. The private sector analogy to taxes is product price.[21] Price-setting corporations recognize that prices have important feedback effects on demand. Furthermore, in some cases, they directly consider the impact of taxes on product demand. In other words, while forecasting is an inexact science, firms recognize that imprecise, dynamic estimates can be better than estimates which assume no dynamic effects (i.e., static estimates).

[21] The analogy should not be pushed too hard. When firms raise prices, consumers can avoid the associated increases by switching to other products. In the public sector, the behavioral responses of consumers are more limited to the extent that taxes are broad-based.

TABLE I
Dynamic Scoring Survey Results From the Fifty States

STATE	USE DYNAMIC SCORING?	DETAILS[a]
Alabama	NO	
Alaska	NO	
Arizona	YES	REMI
Arkansas	YES	REMI
California	YES	Proprietary model
Colorado	NO	
Connecticut	NO	
Delaware	NO	
Florida	NO	
Georgia	YES	Proprietary model
Hawaii	NO	
Idaho	NO	
Illinois	NO	
Indiana	NO	
Iowa	NO	
Kansas	NO	
Kentucky	NO	
Louisiana	YES	REMI
Maine	NO	
Maryland	NO	
Massachusetts	NO	
Michigan	NO	
Minnesota	NO	
Mississippi	NO	
Missouri	NO	
Montana	NO	
Nebraska	NO	
Nevada	NO	
New Hampshire	NO	
New Jersey	NO	

STATE	USE DYNAMIC SCORING?	DETAILS[a]
New Mexico	NO	
New York	YES	Proprietary model
North Carolina	NO	
North Dakota	NO	
Ohio	NO	
Oklahoma	NO	
Oregon	YES	Proprietary model
Pennsylvania	NO	
Rhode Island	NO	
South Carolina	NO	
South Dakota	NO	
Tennessee	NO	
Texas	YES	REMI
Utah	NO	
Vermont	NO	
Virginia	NO	
Washington	NO	
West Virginia	YES	No formal model
Wisconsin	NO	
Wyoming	YES	REMI

NOTE: Survey methodology is described in Section II.

[a] Details are elaborated in the text of Section II.

APPENDIX

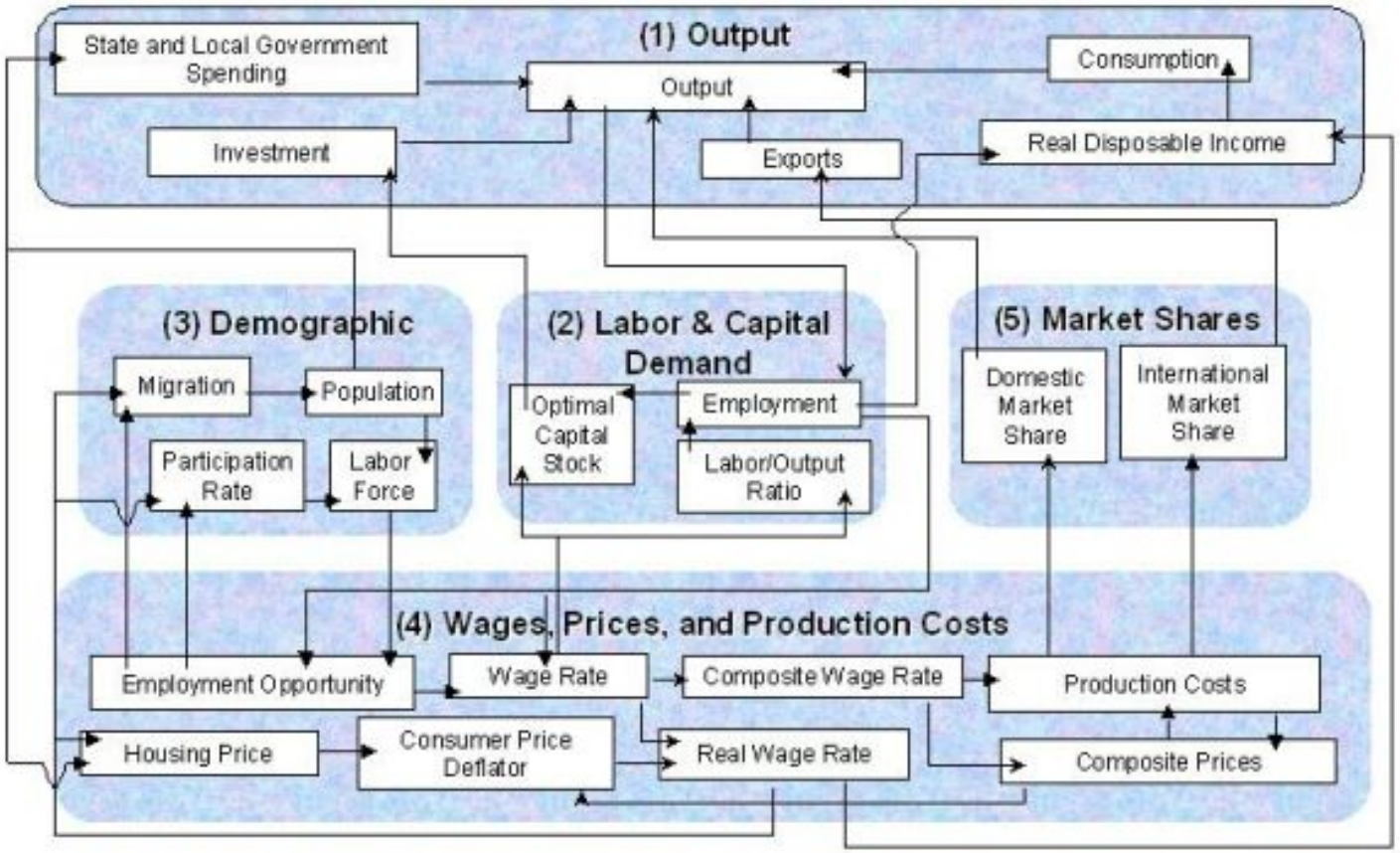
TABLE A-1
Contact Information for State Survey Results

State	Contact Person	Department/Agency	Phone Number
Alabama	Carolyn Middleton	Executive Budget Office	(334) 242-7230
Arkansas	Joe LaFace	Department of Finance and Administration	(501) 682-1941
Alaska	Anna Kim	Legislative Finance Division	(907) 465-5410
Arizona	Jim Everill	Joint Legislative Budget Committee	(602) 542-8980
California	Connie Squires	Department of Finance	(916) 322-2263
Colorado	Julie Hart	Office of State Planning & Budgeting	(303) 866-3310
Connecticut	Thomas Fiore	Office of Policy and Management	(860) 418-6265
Delaware	David Gregor	Department of Finance	(302) 577-8684
Florida	Sarah Voyles	Office of Policy and Budget	(850) 487-2814
Georgia	Henry Thomassen	Office of Planning and Budget	(404) 656-3820
Hawaii	Paul Brewbaker	Council on Revenues	(808) 587-1513
Idaho	Brad Foltman	Division of Financial Management	(208) 334-3309
Illinois	Edward Boss	Economic and Fiscal Commission	(217) 782-5320
Indiana	Bob Lain	State Budget Agency	(317) 232-6310
Iowa	Randy Bauer	Department of Management	(515) 281-3322
Kansas	Duane Goossen	Division of the Budget	(785) 296-2436
Kentucky	Robert W. Cox	Governor's Office for Policy and Management	(502) 564-7300
Louisiana	Gregory Albrecht	Legislative Fiscal Office	(225) 342-7233
Maine	Grant Pennoyer	Office of Fiscal and Program Review	(207) 287-1635
Maryland	Neil Bergsman	Department of Budget and Management	(410) 260-7041

State	Contact Person	Department/Agency	Phone Number
Massachusetts	Stephen Barnard	Fiscal Affairs Division	(617) 727-2081
Michigan	Becky Ross	House Fiscal Agency	(517) 373-8080
Minnesota	Tom Stinson	Department of Finance	(651) 296-5900
Mississippi	Deb Collier Biggers	Office of Budget and Fund Management	(601) 359-5758
Missouri	Tom Kruckemeyer	Division of Budget and Planning	(573) 751-9324
Montana	Terry Johnson	Office of Budget and Program Planning	(406) 444-2952
Nebraska	Tom Berquist	Legislative Fiscal Office	(402) 471-2263
Nevada	Bill Anderson	Department of Administration - Budget Division	(775) 684-0202
New Hampshire	Jack Dianis	Office of Legislative Budget Assistant	(603) 271-3161
New Jersey	Charlene Holzbaur	Office of Management and Budget	(609) 292-6746
New Mexico	Sam Flaim	Department of Finance and Administration	(505) 827-4996
New York	Bob Megna	Division of Budget	(518) 473-0580
North Carolina	Mike Kiltie	Office of State Budget and Management	(919) 733-7061
North Dakota	Sheila Peterson	Fiscal Management	(701) 328-4905
Ohio	Sam Nemer	Office of Budget and Management	(614) 466-6573
Oklahoma	Alison Fraser	Office of State Finance	(405) 521-2141
Oregon	Lizbeth Mahar	Legislative Revenue Office	(503) 986-1261
Pennsylvania	Phil Durgin	Legislative Budget and Finance Committee	(717) 783-1600
Rhode Island	Paul Dion	Department of Administration	(401) 222-6300
South Carolina	Robert Martin	Board of Economic Advisors	(803) 734-3805
South Dakota	Angella Van Scharrel	Bureau of Finance and Management	(605) 773-4145

State	Contact Person	Department/Agency	Phone Number
Tennessee	Jim Davenport	Fiscal Review Committee	(615) 741-2564
Texas	John Heleman	Office of the Comptroller	(512) 475-0042
Utah	Marvin Dodge	Governor's Office of Planning and Budget	(801) 538-1565
Vermont	Stephen Klein	Legislative Joint Fiscal Office	(802) 828-5769
Virginia	Robert Vaughn	House Appropriation Committee Staff	(804) 698-1591
Washington	Adrienne Barker-Scales	Office of Financial Management	(360) 902-0555
West Virginia	Mark Muchow	State Tax Department	(304) 558-8730
Wisconsin	Rob Reinhardt	Legislative Fiscal Bureau	(608) 266-3847
Wyoming	Jim Robinson	Department of Administration and Information	(307) 777-7221

FIGURE A-1



SOURCE: This diagram is taken from the Regional Economic Models, Inc. website at www.remi.com.

Dynamic Revenue Estimating: A State Perspective

By Jay Wortley, Senior Economist
Michigan Senate Fiscal Agency

Introduction

In the first half of the 1990s, interest in dynamic revenue estimating began to grow. While not a new concept, this time period marked a new effort to build econometric models to estimate the dynamic repercussions of given tax policy changes. During this period, a handful of states pioneered attempts to build and use these new models. These states had varying experiences with dynamic revenue estimating, some successful and some not so successful. While other states watched these pioneers in dynamic revenue estimating and tried to learn from their experiences, not many other states took on dynamic revenue estimating. In fact, the interest in dynamic revenue estimating waned in the second half of the 1990s and into 2000. This retrenchment in the interest in dynamic revenue estimating probably was primarily due to the booming economy, which pushed state government revenues to very high levels. As a result, state governments were flush with revenues, and most had enough to cut taxes, increase spending, and put some savings in "rainy-day" funds. Under such good economic times, the need for a dynamic analysis to help justify a tax cut was simply not needed.

At the present time, it appears that interest in dynamic revenue estimating is picking up again. This renewed interest is probably due to the increased use of dynamic scoring at the Federal level, and the fact that the state governments are battling to eliminate budget deficits due to the weak level of economic activity, which has spurred some ideas to change tax policy to help stimulate renewed economic growth.

This paper defines dynamic revenue estimating, and presents Michigan's experience in researching and laying out a game plan for eventually developing a dynamic revenue estimating model. An overview of the general experience and views on revenue sharing among the other states also is presented. Finally, based on this information from Michigan and the other states, this report presents some findings and recommendations that other states may find useful as they consider whether to enter into dynamic revenue estimating.

Revenue Estimates Versus Revenue Impact of Tax Law Changes

In Michigan, the following two types of revenue estimates are conducted:

1) Baseline Revenue Estimates. An important initial step in preparing a state government budget is to estimate the amount of revenue the state's taxes and nontax revenue sources will generate during the next budget period, given no change in the tax structure from one year to the next. These revenue estimates are called baseline estimates and they reveal how tax collections and nontax revenues will change given the level of economic activity that is estimated for the upcoming budget period. This estimate is needed so the governor and legislature know how much revenue will be available as they begin to propose and adopt a budget for the upcoming fiscal year or biennium. These estimates are very important because they will form the foundation for the upcoming budget, which for all states but one, must be balanced. Because of the importance of these revenue estimates in the overall budget process, much time is usually spent estimating the level of economic activity that will prevail during the upcoming budget period, and the amount of revenue that will be generated.

2) Revenue Estimate of Tax Law Changes. The second type of revenue estimate state government economists conduct involves estimating the impact of tax law changes, or in other words, identifying how the income stream projected in the baseline revenue estimates will change given specific proposed changes to existing tax law. These estimates of tax law changes are equally as important as the baseline revenue estimates because in many instances, the final revenue estimates for the upcoming budget period will be derived by integrating these two types of revenue estimates.

For example, based on the economic forecast for wage and salary incomes, non wage incomes, and capital gain realizations in 2003 and 2004, it is estimated that Michigan's income tax, based on the tax structure in effect in 2002, will generate $6.17 billion in fiscal year (FY) 2003-04. This baseline level of income tax collections represents an increase of 2.5% from the FY 2002-03 level. However, a number of changes to the income tax structure have already been enacted into law, and these tax law changes will reduce baseline income tax revenue by an estimated $399 million. As a result, it is estimated that based on the estimates for baseline revenues and the estimates of the impact of tax law changes, income tax collections will total $5.77 billion in FY 2003-04, which represents a decline of 0.8% from the FY 2002-03 level.

Static Versus Dynamic Revenue Estimating Techniques

At the present time, Michigan primarily uses the so-called static approach to estimate the impact of these tax law changes, but an alternative approach would be to analyze tax law changes using a dynamic method. These two different approaches to estimating the fiscal impact of tax law changes are explained below.

Static Revenue Estimating. Under the static revenue estimating method, the impact of a tax law change is assessed only in terms of the initial direct impact the given change in a tax would have on the revenue generated by that particular tax. No impact on taxpayer behavior or economic activity is assumed. For example, if a state's sales tax is currently 5% and generates $5.0 billion in revenue, a purely static analysis would estimate that a decrease in the tax rate to 4.0% would reduce sales tax revenue by $1.0 billion.

Dynamic Revenue Estimating. Under a dynamic revenue estimating approach, the direct impact from the given tax law change is assessed, just as under the static approach, but then the analysis is expanded to incorporate the repercussions or secondary feedback effects that would occur in taxpayer behavior and economic activity due to the tax law change. These secondary or feedback effects also would have repercussions on the revenue that would be generated by the tax being changed and other taxes as well. Under the sales tax example cited above, a dynamic analysis would suggest that a reduction in the sales tax rate would decrease retail prices and therefore increase retail sales, which would help generate new jobs in the retail trade sector. As a result, some of the revenue that the state would lose by cutting the sales tax rate would be offset by new sales tax revenue that would be generated by the increase in retail shopping and by increased income tax revenue, which would be generated by the increase in jobs. Therefore, a dynamic analysis of this sales tax cut, would suggest that the net loss in revenue would be less than the $1 billion loss estimated under the static method.

In Michigan, as in most other states, a revenue estimating method one step more detailed than the static approach, but not a true dynamic approach is used to estimate the impact of sales and excise taxes, including taxes on tobacco and motor fuel. Because changes in these types of taxes affect the price of the item being taxed, there will be an impact on the amount consumed, which will have an impact on the amount of tax revenue collected. This "static plus price effect" method is not a

true dynamic approach because it includes (only) the impact of the initial price change, and does not attempt to estimate any of the other feedback or secondary effects.

In theory it seems clear that using the dynamic approach would provide a much better estimate of the actual impact a given tax change would have on revenues; however, in practice a dynamic approach is much more complicated and difficult to conduct, and there are differing views and opinions on how "dynamic" tax changes really are at the state level. Therefore, before moving toward using dynamic revenue estimating, states should thoroughly evaluate and assess the art of dynamic revenue estimating.

Michigan's Initial Look at Dynamic Revenue Estimating

In the spring of 1996, the Michigan Senate took up a bill that proposed to change the weights given to the three factors (sales, payroll, and property) used to apportion the base of the single business tax to Michigan activity for multistate companies. The bill proposed to increase the weight on sales and decrease the weights on payroll and property. The Department of Treasury and Senate economists estimated that the provisions of this bill would reduce the tax liability of multistate businesses located in Michigan and increase the tax liability of some out-of-state firms that have a fairly strong sales presence in Michigan; however, the net impact was estimated to be a large tax reduction. Proponents of the bill argued that the tax reduction for the Michigan based multistate businesses would be more than offset by the increased taxes that would be paid by out-of-state businesses with a sales presence in Michigan and by a movement of firms relocating to Michigan to take advantage of the tax advantages this apportionment change would provide them.

Proponents of the bill argued that their analysis was based on a dynamic analysis and that the government economists were using the outdated static method. The government economists admitted to using the static method, but claimed the so-called dynamic results the proponents were presenting were not believable. The static estimates were used to score the bill and in the end the Legislature agreed to a compromise tax change that had a much smaller revenue reduction (based on a static estimate) and the bill was enacted into law.

However, it was clear the dynamic revenue estimating issue was not going to go away, so the government economists decided to face this issue straight on and help educate themselves and all other interested parties on the strengths and weaknesses of static versus dynamic revenue estimating techniques. To do this, the government economists put together a one-day conference on dynamic revenue estimating. This conference brought in experts from academia and private consultants to help explain dynamic revenue estimating, along with officials from three states who had varying levels of direct experience using dynamic revenue estimating models. The three states with first hand experience in dynamic revenue estimating represented at the conference were California, Massachusetts, and Minnesota.[1)]

Massachusetts created a dynamic model in 1992 to estimate the impact of a proposed investment tax credit as part of the state's corporate income tax. A special advisory panel was created to oversee the development of the model: the panel included legislative leaders, and academic and business economists, and the model was actually built by a private consultant. The model's assessment of the impact of the proposed investment tax credit was much smaller than was expected by some state officials, and as a result, the analysis based on the model's output was criticized and basically rejected by the legislative supporters of the bill.[2)]

Minnesota created a dynamic model in 1993 to estimate the impact of a proposal to exempt capital purchases from the Minnesota sales tax. A special advisory group and a technical support group were used to help develop the model and Minnesota Department of Revenue staff actually built it. The model was based on a Regional Economic Model (REMI)[3] input/output model, along with several micro-simulation models, and numerous key assumptions. The model and its results were well received by the legislature and business leaders.[4]

California also built a dynamic model in the 1990s, but unlike Massachusetts and Minnesota, which developed models to assess the dynamic affects of one particular proposal, California passed a law requiring a dynamic analysis to be done for all proposed tax changes that have a static impact of at least $10 million. California hired an economist to build and maintain a computable general equilibrium (CGE) model and then be responsible for preparing the dynamic revenue estimates.[5]

The discussion at Michigan's conference on how dynamic models work, together with the experiences and results from these other states, provided a very thorough and open discussion on dynamic revenue estimating. Over 60 people attended the conference, and the feedback was very positive.

A few months later, Michigan Legislative and Department of Treasury economists were invited to attend a symposium on dynamic revenue estimating hosted by the Congressional Joint Committee on Taxation in Washington, D.C. This symposium culminated a year-long study during which nine groups of economists simulated the dynamic effects of three alternative tax systems. This meeting was very unique in that it included economists from across the country who were on the cutting edge of dynamic revenue estimating modeling.

The information garnered from both of these meetings was used by Michigan's economists to list several conclusions and observations that are still relevant in 2003.

Michigan's Key Observations and Conclusions Regarding Dynamic Revenue Estimating

Limited Experience. While the experience and knowledge about dynamic revenue estimating among states has increased over the past few years, the development and use of dynamic models is still fairly limited at the state level, as the survey presented later in this paper shows.

Improved Static Estimates. While static estimates are much less complicated than dynamic estimates, that does not mean they are easy. In fact, Michigan, and probably other states as well, needs to improve the tools it uses to make static revenue estimates. Dynamic revenue estimating does not replace the need for static estimates, but rather requires more detailed breakdowns of the static impacts by income group or business type and size.

Need For Data. Dynamic models need a large amount of economic data, which is not always available on a state basis. In addition, what data are available, particularly state personal income data, seems to be getting less reliable and more prone to major revisions. How best to deal with this problem is a fundamental question that must be answered early in the process.

Taxes in Other States. Some variables that affect the ultimate dynamic impact of a proposed tax policy change in a given state are very difficult if not impossible to estimate; examples are how other states will change their taxes in response to the proposed tax change and how these changes in other states will erode the dynamic impacts in your state.

Short- and Long-Term Impacts. The secondary feedback effects of a given tax change will not occur right away or even during the first year following the initial tax change. In fact, it may take five years or longer for the dynamic effects to play out fully, particularly when investment decisions may be altered when a business tax change is involved, or locations may change in reaction to an income tax change. Many, if not most, of the models being used to measure dynamic effects are designed to show the change that will take place from the time the tax change is made (point A) to the time when a new equilibrium is reached (point B), but the models are not very good at estimating how long it will take to get from point A to point B, or how the changes will progress along this time period.

Expectations Management 101. Some people strongly believe that the dynamic impacts of a tax reduction will be large enough to offset most, if not all, of the direct tax loss associated with the tax cut. For example, in Michigan it was sincerely believed by some legislators and business officials, that putting more weight on the sales apportionment factor would generate new business activity in Michigan to the extent that a direct static revenue loss of close to $200 million would be more than offset by the positive dynamic effects. Similarly, legislators and business leaders in Massachusetts had expectations that an investment tax credit would generate new business activity so that the revenue generated from the new business activity would offset most of the cost of the investment tax credit. In fact, many dynamic analyses are estimating relatively small dynamic impacts.

Changes in Revenues and Expenditures. If a dynamic model is going to be complete, it must take into account the impact of changes in expenditures, as well as revenues, that would occur as a result of a tax change. States must enact and implement a balanced budget. If taxes are reduced, then spending also will be reduced. State taxes do have impacts on disposable income, prices, earnings, and business profits to varying degrees, but so do state government expenditures. Direct state spending on education, roads, public transportation, public safety, the courts, and social programs helps create jobs and income. While a tax cut will help stimulate secondary dynamic effects by increasing peoples' disposable income and businesses' profitability, it also will have secondary negative dynamic repercussions by reducing spending in one or more of these public goods. These offsetting spending repercussions are probably a major reason why dynamic effects for state governments are relatively small.

One Model Does Not Fit All Tax Changes. It is not practical to conduct a dynamic analysis for all tax change proposals. Dynamic models are best suited for broad changes in the structure of the major taxes. Relatively small, narrowly focused tax changes are probably not going to be easy to adapt to the model. Besides, for many of these types of tax change proposals, it is very difficult even to come up with a respectable static estimate, let alone a dynamic estimate built off of the shaky static estimate. For example, a recent proposal in Michigan to provide a special income tax credit for school loan payments by dentists who provide dental services to medicaid patients, was difficult to estimate on a static basis due to the lack of information on the number of dentists in Michigan who are still paying student loan debt and the number of dentists who are accepting Medicaid patients or who provide their services gratis to Medicaid patients and other low-income people. Because of the lack of good data, the static estimate of the proposal's impact was presented in the form of a range. A dynamic analysis, based on a shaky range, would only provide an even broader and shakier range, and would therefore not supply much useful information. In addition, it probably would be difficult to adapt this narrowly focused tax change to most dynamic models.

Michigan's Dynamic Decision

Based on the information gathered at Michigan's Dynamic Revenue Estimating Conference, the following plan of action was proposed by economists in the Senate, House, and Department of Treasury in regards to including a dynamic revenue estimating model in Michigan's revenue estimating tools[6)]:

Recommendation #1: Improve and expand the microsimulation models available for estimating the direct (static) revenue impacts of tax law changes.

Based on the information gathered on dynamic revenue estimating, Michigan's revenue estimators did not believe the art and science of conducting dynamic revenue estimates were at a level that made it worth devoting resources to developing such a model. However, given that 1) it is very important to provide accurate and detailed estimates of the direct impact of proposed tax law changes so State elected officials can make informed tax policy decisions, and 2) the direct impact of tax law changes is the essential first step in preparing dynamic revenue estimates, it seemed clear that the first logical step for Michigan was to improve its income and single business tax simulation models, and also develop sales tax and property tax models, as well as a tax incidence model incorporating all of these major taxes.

Recommendation #2: Once the additional micro-simulation and tax incidence models have been developed, staff should review the progress of dynamic modeling in other states and determine when the time is right to develop a dynamic revenue estimating model for Michigan.

Given the very limited experience states have in conducting dynamic revenue estimates, and the need to improve our existing models for estimating the direct impact of tax law changes, it was decided that it would be advantageous for Michigan to put off developing a dynamic model until the art and science of dynamic revenue estimating becomes more developed and Michigan has better tools to estimate the all-important direct impacts.

These recommendations were generally accepted by Michigan's Governor and Legislature, as evidenced by the $500,000 that they appropriated for improving and expanding our tools for estimating the direct impact of tax law changes. Unfortunately, the recession hit Michigan in the summer of 2000, and after a formal request for proposal (RFP) was issued in 2001, these funds, along with the funds from numerous other special projects, were diverted to help eliminate a budget shortfall. As a result, Michigan has not been able to expand its tax micro-simulation models and does not have a dynamic model.

Views of Other States

Most states have investigated dynamic revenue estimating and made assessments on whether they should be developing a dynamic model to add to their tools to estimate the impact of tax law changes. Most states do not have dynamic revenue estimating models, but the number of states that have them are increasing. A survey was conducted this fall to help identify the extent to which dynamic revenue estimating models are being used by state governments, and to update a survey that was conducted in 1996. The preliminary results of this survey are summarized in the table that follows.

STATE GOVERNMENTS AND DYNAMIC REVENUE ESTIMATING Survey Results[1)]				
	Does Your State Conduct Dynamic Revenue Estimates for Proposed Tax Law Changes?			If Yes, How Many Dynamic Analyses Were Completed
State	No	Yes	No Reply	This Year?
Alabama	No			
Alaska			X	
Arizona	No			
Arkansas		Yes		3
California		Yes		70 - 80
Colorado	No			
Connecticut			X	
Delaware	No			
Florida	No			
Georgia			X	
Hawaii			X	
Idaho	No			
Illinois	No			
Indiana	No			
Iowa	No			
Kansas	No			
Kentucky	No			
Louisiana		Yes		Less Than 5
Maine	No			
Maryland	No			
Massachusetts	No			
Michigan	No			
Minnesota	No			
Mississippi			X	
Missouri			X	
Montana	No			
Nebraska			X	
Nevada			X	
New Hampshire			X	
New Jersey	No			
New Mexico		Yes		1
New York	No			
North Carolina	No			
North Dakota			X	
Ohio	No			
Oklahoma	No			
Oregon		Yes		8
Pennsylvania	No			
Rhode Island			X	
South Carolina			X	
South Dakota			X	
Tennessee			X	
Texas		Yes		?
Utah	No			
Vermont	No			
Virginia			X	
Washington	No			
West Virginia			X	
Wisconsin	No			
Wyoming			X	
Total Replies	**27**	**6**	**17**	**-----**

(1) Michigan Senate Fiscal Agency survey on dynamic revenue estimating conducted in September and October 2003.

Source: Survey conducted and compiled by the Michigan Senate Fiscal Agency.

In 1996, only five states were identified as having made an attempt to conduct a dynamic analysis, and most of the other states were clearly on the sidelines with no immediate plans to venture into this area. Of the approximately 7,000 proposed tax law changes analyzed by state revenue estimators in 1996, only 10 included a dynamic analysis.

The latest survey reveals that most states are still not using dynamic revenue estimating. Of the 32 states that have thus far responded to the survey, six states are currently using dynamic revenue estimating techniques; however, California is the only state that was doing dynamic revenue estimating in 1996 and is still doing it. The other states currently conducting dynamic revenue estimates are Arkansas, Louisiana, New Mexico, Oregon, and Texas. Minnesota and Massachusetts, both of which had developed a dynamic model to help evaluate a particular issue in the 1990s, now report that no new efforts have been made to use dynamic revenue estimating. In addition, Washington reports that while it began to develop a dynamic model in the 1990s, the model was never completed and there are no plans to complete it at the present time.

Arkansas has developed a dynamic model based on a REMI input-output model. The Arkansas model is called a Regional Economic and Demographic Forecasting Model and it has 53 industrial sectors and 202 demographic variables. Out of 65 static analyses conducted this past year, a dynamic analysis was completed for only three proposed tax changes. These three dynamic analyses included analyzing a shift from the property tax to the sales tax, an increase in the top marginal rates of the state's individual income tax, and a two percentage point increase in its sales tax rate. For the income tax and sales tax rate increases, the dynamic effects exceeded the static effects by about 15% on average, and these dynamic affects were estimated to occur over a three- to five-year period.[7)]

California continues to be much more active in completing dynamic revenue estimates than any other state. In 2003, 70 to 80 dynamic analyses were completed by the California Department of Finance using a CGE model. The law requiring that dynamic revenue estimates be completed for any proposed tax law change with a static impact of at least $10 million expired in 2000; however, the Department of Finance continues to prepare these estimates. The dynamic impacts are being reported in the official fiscal notes as additional information, along with the static revenue estimate, but the dynamic estimates are not necessarily being included in the official revenue estimates if and when the tax change is enacted. California reports that the dynamic impacts associated with static estimates of a $100 million tax reduction average about 7% for the sales tax, 1% for the individual income tax, and 15% or higher for business taxes.[8)]

Louisiana has recently developed a dynamic revenue estimating model based on a REMI input-output model. The model is being used only for major tax changes and has been used only on a few occasions so far. In addition, the dynamic effects are not being used in the official revenue estimates. The tax proposals for which a dynamic analysis has been estimated include reductions in the sales tax on machinery and equipment, and changes to the corporate franchise tax. The feedback effects have so far averaged under 10%.[9)]

New Mexico recently had a dynamic model built based on a REMI input-output model. The only dynamic analysis done so far was to simulate a 25% reduction in the state's personal income tax. The dynamic impact was less than 1%.[10)]

Oregon conducts dynamic revenue estimates using a model called the Oregon Tax Incident Model (OTIM), which is a computable general equilibrium model. This model was developed by the Oregon Legislative Revenue Office. During the past year, static estimates have been prepared for 192 proposed tax changes, but dynamic analyses have been conducted on only eight of these proposals. The model is used primarily for simulating income, corporate excise, sales and use, and

property tax changes, but is also capable of analyzing consumer excise taxes. The average differences between the static and dynamic impacts for a $100 million tax increase are 9.6% for the income tax, 17.1% for the corporate excise tax, 10.4% for the business excise tax, 11.3% for the business property tax, and 15% for a 5% sales tax.[11)]

Texas also has developed a dynamic revenue estimating model, but information on its use and results has not yet been obtained.[12)]

In addition to these six states that are currently producing at least a few dynamic revenue estimates, six other states reported that they had done at least one dynamic revenue estimate in the past, but were not conducting any at the present time. These states include Florida, Iowa, Kentucky, Massachusetts, Minnesota, and Pennsylvania.

Of the 27 states that responded to the survey and reported no current or past use of dynamic revenue estimating, their reasons for not using dynamic models fell in the following four major groups:

1. Unreliable Results. Dynamic revenue analyses are highly dependent on key assumptions and therefore can produce wide variations in the results depending on the assumptions. In addition, some states believe these models are not good at identifying the timing of the impact. As a result of these deficiencies, states believe dynamic revenue estimating results would be too controversial and undercut the credibility of nonpartisan revenue estimators.

2. Small Impacts. Given the balanced budget requirements states face, the dynamic impacts of tax law changes are going to be generally small and therefore not worth the time, money, and controversy involved in developing, maintaining, and running a dynamic model.

3. No Money. Many states reported that they have no money or staff time to devote to developing, buying, or maintaining a dynamic model.

4. No Pressure or Need. A number of states reported that legislators and the governor have not expressed any interest in dynamic revenue estimates, so they are not under any pressure to move toward dynamic revenue estimating.

Overall Conclusions and Recommendations

Based on Michigan's research in the area of dynamic revenue estimating and the views expressed by revenue estimators in other states, the following observations, suggestions, and recommendations are made to state revenue estimators regarding dynamic revenue estimating.

1. Static Models. Before contemplating moving towards developing a dynamic revenue estimating model, your staff time and agency money may be better used to improve your tools available to help estimate the direct or static impacts of proposed tax law changes. Whether a state has a dynamic model or not, State revenue estimators spend much more time estimating the static impacts of tax law changes.

2. Size of Dynamic Effects. Experience from the few states that have at least some experience estimating dynamic impacts suggests that the dynamic effects at the state level are typically going to be fairly small. This is primarily due to the fact that states have to maintain a balanced budget. If taxes are reduced, the positive dynamic effects on taxpayer income and employment will be offset by negative dynamic effects caused by state government spending reductions.

3. Dynamic Margins of Error. Dynamic revenue estimates will inherently have a larger margin of error than static revenue estimates have. First, static revenue estimates are used as the starting point for dynamic revenue estimates, so the errors built into static estimates will be picked up in the dynamic estimates. Second, when making dynamic estimates, estimators must make some major assumptions such as how other states will react, particularly regarding business tax changes. These assumptions add to the error band around the dynamic revenue estimates.

4. Timing of Dynamic Effects. The dynamic effects of tax law changes will take place over a several-year period. When making changes to tax structures, most states are primarily focused on the effects the change will have on the current budget period, which is typically one to two years into the future. If most dynamic effects will not be fully realized until three to five years into the future, then the additional revenue changes identified by dynamic revenue estimating for the immediate budget period may be very small.

5. Dynamic Estimates and the State Budget. The strength of dynamic models is probably their ability to provide elected officials with information on the potential total impact of a given tax law change, both static and secondary feedback effects, over a several-year period, given certain assumptions. However, due to the size of the potential errors that may be contained in dynamic revenue estimates, and the uncertainty about the timing of these effects, dynamic revenue estimates should not be used to help make the actual revenue estimates on which the overall budget is based.

6. Proactive Approach. If there is interest or pressure in your state to move toward dynamic revenue estimating, keep an open mind and be proactive. Gather information from other states' experiences, both good and bad. Help educate elected officials and administration leaders by clearly laying out the advantages and disadvantages of dynamic revenue estimating. If there is interest among legislators and other government officials in developing a dynamic model, it is important that revenue estimators be part of the process to make sure the end product is as useful as possible.

7. Open Process. If the decision is made to develop a dynamic model, it is essential that the entire process be as open as possible. An open process will help reduce the mystery about the model and help give it credibility once it is operational. One way to help keep the process open is to establish an advisory committee of experts to oversee the model's development. Staffing this committee with knowledgeable people from varying interest groups will help improve the ultimate product and only add to the model's credibility.

8. Proper Expectations. Help form proper expectations. First, as part of the education process, make sure that the experience of other states in terms of the general magnitude of the feedback effects, and why they are the size they are, is well known. This will help prevent some surprises when the model starts providing results. In addition, it is important that people understand that dynamic estimates are not necessarily easy and quick to complete, but may take some time to be done right.

9. Limit On Tax Changes Analyzed. Given the relatively small feedback effects estimated by the states that currently do dynamic analyses, the complexity of running a model and the time required to do it right, it may be appropriate to limit dynamic analyses to major tax policy changes only.

Footnotes:

1. "Dynamic Revenue Estimating: Will it Work for Michigan?", Joint Report of the Michigan House Fiscal Agency, Senate Fiscal Agency, and Department of Treasury, March 1997.

2. Scott Jordan, Deputy Director, Tax Policy Analysis, Massachusetts Department of Revenue. Presentation at Michigan's Dynamic Revenue Estimating Seminar, September 30, 1996.

3. Regional Economic Modeling Incorporated (REMI), information on their models is available at www.remi.com.

4. Bob Cline, Director, Tax Policy Analysis, Minnesota Department of Revenue. Presentation at Michigan's Dynamic Revenue Estimating Seminar, September 30, 1996.

5. Bruce Smith, Economist, California Department of Finance. Presentation at Michigan's Dynamic Revenue Estimating Seminar, September 30, 1996.

6. "Dynamic Revenue Estimating: Will it Work for Michigan?", March 1997.

7. Joseph LaFace, Office of Economic Analysis and Tax Research, Arkansas Department of Finance and Administration. Survey response, September 29, 2003.

8. Bruce Smith, Economist, Financial, Economic, and Demographic Research, California Department of Finance; and Phil Spilberg, Director, Economic and Statistical Research Bureau, California Franchise Tax Board; phone interviews on October 16, 2003.

9. Greg Albrecht, Chief Economist, Louisiana Legislative Fiscal Staff; phone interview on October 29, 2003.

10. Tom Clifford, New Mexico Department of Taxation and Revenue; Survey response, September 30, 2003.

11. Lizbeth Mahar, Oregon Legislative Revenue Office; Survey response, October 2, 2003.

12. "Dynamic Modeling: New Method of Tax Analysis Accounts for Taxpayer Behavior", April 2001, which Includes a reprint of an article by Carole Keeton Rylander, Texas Comptroller of Public Accounts, describing how her office uses dynamic modeling, that was originally printed in Fiscal Notes, April 1999; and Dean Ferguson, Revenue Estimating Division, Texas Comptroller of Public Accounts, phone discussion on October 27, 2003.