Backgrounder

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Dynamic Analysis at Treasury: What Are the Next Steps?

Tracy L. Foertsch, Ph.D.

The President's fiscal year (FY) 2007 budget submission to Congress includes a number of important initiatives. Among them is a plan to create a Dynamic Analysis Division within the Office of Tax Analysis (OTA) in the U.S. Department of the Treasury.

Dynamic analysis gauges the impact on federal tax revenues of the changes in output and incomes induced by changes in tax policy. Proponents of supply-side tax cuts and fundamental tax reform provided much of the original push for dynamic analysis. They did so because conventional revenue estimates may take into account the microeconomic behavioral effects of a tax policy change,[1] but they exclude the effects on federal tax receipts of changes in macroeconomic factors like labor force participation, investment, and capital accumulation. Dynamic analysis makes use of advances in computing technology and economic modeling to generate dynamic revenue estimates that include these macroeconomic factors.

The tax agenda has now shifted. In the short run, the focus will likely be on which of the expiring provisions of the 2001 and 2003 tax acts, if any, to extend. In the longer run, devising a tax policy that generates additional revenues without slowing economic growth will likely be an important part of the policy debate.

Dynamic analysis has a key role to play in this debate. Providing one dynamic "score"—or one dynamic estimate of the revenue effects of a tax policy change—may be difficult to envision. The choice of macroeconomic model along with the assumptions

Talking Points

- The President's fiscal year 2007 budget proposed creating a new Dynamic Analysis Division within the Treasury Department. This new division would analyze the macroeconomic and dynamic revenue effects of changes in tax policy.
- Dynamic analysis involves estimating the impact of a tax policy change on macroeconomic variables like gross domestic product, personal and corporate incomes, consumption, investment, and hours worked.
- Dynamic revenue estimates include the macroeconomic ("dynamic") effects of a change in tax policy on federal tax revenues.
- Policy analysts can use this information to evaluate tax policy changes on the basis of their macroeconomic and revenue effects.
- A Dynamic Analysis Division at the Treasury Department could enhance the budget process.

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Published by The Heritage Foundation
214 Massachusetts Avenue, NE
Washington, DC 20002–4999
(202) 546-4400 • heritage.org

made about monetary policy in the short run and fiscal policy in the long run can influence dynamic estimates, sometimes even changing the sign of estimated gross domestic product (GDP) and revenue effects. However, dynamic estimates can still enhance the budgeting process by helping to identify and rank those provisions of a tax proposal that are most likely to achieve policymakers' stated objectives.

Recent Efforts

Both the Joint Committee on Taxation (JCT) and the Congressional Budget Office (CBO) have been working to integrate dynamic estimates into the budgeting process. The JCT's efforts began in earnest with a 1997 symposium on "Modeling the Macroeconomic Consequences of Tax Policy."[2] In March 2003, the CBO published its first dynamic analysis of the President's budget.[3] Both the JCT[4] and the CBO[5] have since released papers exploring the application of macroeconomic models to the analysis of the economic and budget effects of tax policy changes.

The Treasury Department has recently begun to produce its own dynamic estimates. The President's Advisory Panel on Federal Tax Reform used dynamic analysis from the Treasury Department to help to evaluate different reform options.[6] The FY 2007 *Mid-Session Review* included for the first time dynamic estimates of the economic effects of one of the President's tax proposals—permanently extending some provisions of the 2001 Economic Growth and Tax Relief Reconciliation Act (EGTRRA) and the 2003 Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) that are set to expire in 2010.[7]

A Dynamic Analysis Division within the OTA would help to institutionalize this work at the Treasury Department. The U.S. House of Representa-

1. Thus, conventional revenue estimates may include shifts between business sectors and entity forms and in the timing of transactions and income recognition.
2. See Joint Committee on Taxation, U.S. Congress, *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS–21–97, November 20, 1997, at *www.house.gov/jct/s-21-97.pdf* (December 1, 2006).
3. See Congressional Budget Office, *An Analysis of the President's Budgetary Proposals for Fiscal Year 2004*, March 2003, at *www.cbo.gov/ftpdocs/41xx/doc4129/03-31-AnalysisPresidentBudget-Final.pdf* (December 1, 2006). Prior to March 2003, the CBO's annual analysis of the President's budget did not include a chapter on the macroeconomic effects of the President's budget proposals.
4. For example, see Joint Committee on Taxation, U.S. Congress, *Macroeconomic Analysis of Various Proposals to Provide $500 Billion in Tax Relief*, JCX–4–05, March 1, 2005, at *www.house.gov/jct/x-4-05.pdf* (July 31, 2006), and *Exploring Issues in the Development of Macroeconomic Models for Use in Tax Policy Analysis*, JCX–19–06, June 16, 2006, at *www.house.gov/jct/x-19-06.pdf* (December 1, 2006). See also Rosanne Altschuler, Nicholas Bull, John Diamond, Tim Dowd, and Pamela Moomau, "The Role of Dynamic Scoring in the Federal Budget Process: Closing the Gap Between Theory and Practice," *American Economic Review*, Vol. 95, No. 2 (May 2005), pp. 432–436, and Joint Committee on Taxation, U.S. Congress, *Overview of Work of the Staff of the Joint Committee on Taxation to Model the Macroeconomic Effects of Proposed Tax Legislation to Comply with House Rule XIII.3.(h)(2)*, JCX–105–03, December 22, 2003, at *www.house.gov/jct/x-105-03.pdf* (December 1, 2006).
5. For example, see Congressional Budget Office, "How CBO Analyzed the Macroeconomic Effects of the President's Budget," July 2003, at *www.cbo.gov/ftpdocs/44xx/doc4454/07-28-PresidentsBudget.pdf* (May 16, 2006), and Robert Dennis *et al.*, "Macroeconomic Analysis of a 10-Percent Cut in Income Tax Rates," Congressional Budget Office *Technical Paper* 2004–07, May 2004, at *www.cbo.gov/ftpdocs/54xx/doc5485/2004-07.pdf* (July 31, 2006).
6. See President's Advisory Panel on Federal Tax Reform, *Simple, Fair, and Pro-Growth: Proposals to Fix America's Tax System*, November 2005, pp. 224–225, at *www.taxreformpanel.gov/final-report* (December 1, 2006).
7. See Office of Management and Budget, *Mid-Session Review, Budget of the United States Government, Fiscal Year 2007* (Washington, D.C.: U.S. Government Printing Office, 2006), pp. 3–4, at *www.whitehouse.gov/omb/budget/fy2007/pdf/07msr.pdf* (December 1, 2006). In July 2006, the OTA released a separate report giving a detailed description of the dynamic analysis included in the fiscal year 2007 *Mid-Session Review.* See U.S. Department of the Treasury, Office of Tax Analysis, "A Dynamic Analysis of Permanent Extension of the President's Tax Relief," July 25, 2006, at *www.treasury.gov/press/releases/reports/treasurydynamicanalysisreporjjuly252006.pdf* (December 1, 2006).

tives has already approved roughly $520,000 in funding for a nascent Dynamic Analysis Division. However, the funding is still pending in the U.S. Senate and could become the first casualty of the Democratic takeover of Congress in January.

This would be regrettable. A Dynamic Analysis Division at the Treasury Department could do much to inform the budget debate. One way to see this is to consider what the next steps for dynamic analysis at the department could be, assuming the Senate approves funding before the 109th Congress adjourns.

The Next Steps at the Treasury Department

The answers to four questions are important when considering the next steps that the Treasury Department should take in developing its dynamic analysis capabilities.

- Which macroeconomic models should the OTA use for its dynamic analysis?
- How can the OTA's dynamic estimates account for the key macroeconomic effects of a tax policy change?
- How should the OTA estimate revenue feedbacks from a tax policy change?
- What kinds of dynamic estimates should the OTA provide?

Which macroeconomic models should the OTA use for its dynamic analysis? The choice of which macroeconomic model to use depends on the goal of the proposed change in tax policy and the economic environment in which it is being considered.

Large-scale macroeconometric models are a good choice when a tax policy change is intended to stimulate aggregate demand in the short run. Such models impose the long-run structure of a neoclassical growth model, but their baselines include unemployment and short-run gaps between actual and estimated potential GDP. Thus, they can be used to analyze how changes in monetary and fiscal policy affect employment, personal and corporate incomes, personal consumption and saving, residential and business fixed investment, and other key macroeconomic variables in the short run.

General equilibrium (GE) models are a better choice when the long-run effects of a tax policy change on labor hours, capital, and GDP are the primary focus of analysis. GE models are full-employment models in which prices are assumed to adjust instantaneously to equate supply and demand. GE models used for fiscal policy analysis typically impose the government's intertemporal budget constraint. Thus, the government cannot indefinitely finance higher spending or lower taxes with deficits. Rather, in the long run, it must cut spending or raise taxes to limit the growth rate of debt to the growth rate of GDP.

The effects of a tax policy change on labor supply and investment can vary dramatically depending on whether the government finances higher spending or lower taxes today with lower spending or higher taxes tomorrow. This is because households and firms are assumed to know the future course of fiscal policy with perfect foresight and to make decisions about how much to work, save, and invest accordingly.

Large-scale macroeconometric models can also be used to analyze the effects of tax policy changes intended to boost the economy's stock of labor and capital in the long run. However, doing so often requires making assumptions about the response of hours worked and investment to changes in marginal tax rates on labor and capital income. Such assumptions are sometimes necessary because macroeconometric models focus on the short-run effects of tax policy changes on disposable income and consumption. Households and firms are not assumed to know the future course of fiscal policy and thus do not adjust work, saving, and investment in response to the long-run effects of changes in marginal tax rates on the returns to capital and labor and the cost of capital.

That said, analyzing marginal rate cuts in a macroeconometric model has the advantage of allowing one to compare the macroeconomic effects to the CBO's baseline economic and budgetary projections over the 10-year budget period. GE models do not afford the same opportunity because they are typically calibrated to baselines that are consistent with full employment and a sustainable fiscal policy.

The CBO and the JCT use several macroeconomic models when producing dynamic estimates. In its most recent dynamic analysis of the President's budget, the CBO used two GE models, including an overlapping generations (OLG) model, and two macroeconometric models, including the Macroeconomic Advisers' (MA) model.[8] The JCT has a set of models with similar capabilities available for dynamic analysis, including the Tax Policy Advisers (TPA) OLG life-cycle model and a macroeconomic growth (MEG) model. The MEG model, like the MA model, can be used to evaluate changes in tax policy meant to boost aggregate demand in the short run.

A new Dynamic Analysis Division should similarly maintain a mix of models that will give it the flexibility to do dynamic analyses of tax policy changes intended to boost aggregate demand in the short run and the economy's stock of labor and capital in the long run.[9]

How can the OTA's dynamic estimates account for the key macroeconomic effects of a tax policy change? Accounting for the key macroeconomic effects of a tax policy change presents a challenge. The extent to which a set of dynamic estimates accomplishes this depends in large part on the degree of disaggregation in the macroeconomic model being used.

The Internal Revenue Code is extremely complex, with a progressive rate structure, different tax rates for capital gains realizations and dividend income, an alternative minimum tax, and myriad large and small tax credits and deductions. Most proposed changes in U.S. tax law do not affect all taxpayers and sources of income uniformly. Rather, they are often tailored to benefit specific subsets of taxpayers or sectors. Thus, a proposal can apply different tax rate changes to different sources of income. It can also create tax incentives to reallocate income and resources from one sector or use to another.

Microsimulation models of the federal individual and corporate income tax capture the complexity of the U.S. tax code. They are based on large samples of tax returns that are weighted to match the taxpayer population. As a result, they can generate finely disaggregated measures of the impact of a tax policy change on federal income tax revenues and average effective marginal income tax rates. Microsimulation models of the federal individual income tax can also be used to estimate changes in labor supply by type of worker and income size. Outputs from microsimulation models are input into macroeconomic models when simulating the macroeconomic and dynamic revenue effects of a tax policy change.

Macroeconomic models capture little of the complexity of the U.S. tax code. They tend to be highly stylized, often aggregating different sources of income and tax rates into a handful of economic and tax sectors. As a result, they implicitly assume that most taxpayers and sources of income are treated as equivalent in the U.S. tax code.

Taking such an approach to dynamic analysis is problematic. Highly aggregated macroeconomic models cannot explicitly account for the macroeconomic effects of applying different tax rates and tax credits to different sources of income and income classes. They also cannot explicitly account for the macroeconomic effects of changes in the tax code, which create incentives to reallocate income and resources to tax-favored sectors of the economy. Accounting for these macroeconomic effects would require a macroeconomic model that is sufficiently disaggregated to take as inputs more disparate microsimulation-model estimates of the revenue, marginal rate, and labor supply effects of tax policy changes.

The JCT disaggregates income—and thus tax rates and revenues—in its macroeconomic models. For example, the MEG model includes tax rates for wages and salaries, interest income, rental income, dividend income, capital gains, proprietors' income, other individual income, and corporate income.[10] In contrast, in its GE models, the CBO

8. See Congressional Budget Office, *An Analysis of the President's Budgetary Proposals for Fiscal Year 2007*, March 2006, at *cbo.gov/ftpdocs/70xx/doc7069/03-14-PresidentsBudget.pdf* (December 1, 2006).
9. The Treasury Department used only the TPA model in its recent dynamic analysis of extending EGTRRA's and JGTRRA's expiring provisions. However, it has used the MA model to estimate the economic effects of tax relief passed in 2001, 2002, and 2003.

does much less to disaggregate changes in tax rates. In general, tax policy changes are summarized using average effective marginal tax rates on labor and capital income. The JCT has found that its dynamic estimates of the economic and budget effects of tax policy changes are sensitive to the degree of disaggregation included in the macroeconomic model.

In its *Mid-Session Review* dynamic analysis of the President's tax proposals, the OTA takes an approach similar to that of the JCT. The OTA inputs into the TPA model estimated changes in marginal tax rates on capital gains, dividend income, wage and salary income, interest income, and business income. A new Dynamic Analysis Division should continue to disaggregate tax rates and sources of income in its macroeconomic models.

How should the OTA estimate revenue feedbacks from a tax policy change? Revenue feedbacks are the *additional* tax revenues that will be collected relative to a baseline forecast. They are the result of the macroeconomic effects of a tax policy change on federal receipts. Policy analysts can use such information to gauge the extent to which a tax policy change is likely to improve the government's finances by generating higher levels of economic activity, higher incomes, and additional revenues.

Disaggregation also has a role to play when estimating revenue feedbacks. Revenue feedbacks can be calculated as simply the difference between a dynamic revenue estimate from a macroeconomic model and a conventional revenue estimate from a microsimulation model. Alternatively, they can be calculated by simulating the macroeconomic effects of a change in tax policy and then updating the microsimulation model to reflect changes in the forecast levels of incomes and prices.

Calculating revenue estimates using an updated microsimulation model is potentially important because the microsimulation model includes a high degree of disaggregation. Thus, the microsimulation model estimates the change in income tax payable on a tax return basis. In contrast, a macroeconomic model can at best estimate a change in aggregate tax revenues by income source.

In The Heritage Foundation's Center for Data Analysis, we estimate revenue feedbacks from major changes in the federal individual income tax using a microsimulation model.[11] Specifically, we iterate between a microsimulation model of the federal individual income tax and a macroeconomic model of the U.S. economy, in our case the Global Insight (GI) model. We update individual and business incomes in the microsimulation model using outputs from the GI model. We then use revenue and marginal rates estimates from the updated microsimulation model to adjust forecasts from the macroeconomic model so that they better reflect the effects of the tax proposal. We continue in this way until differences between the estimated changes in federal individual income tax revenues in the microsimulation model and federal personal income tax revenues in the GI model are minimal or can be accounted for by definitional and other differences in the federal income tax bases used.

Estimates of revenue feedbacks can be sensitive to how they are calculated. An analysis of permanently extending some of the 2001 and 2003 tax acts' expiring provisions put revenue feedbacks at $296.3 billion over 10 years, based on a comparison of the dynamic revenue estimate from the macroeconomic model and the conventional revenue estimate from the microsimulation model.[12] A comparison of the dynamic revenue estimate obtained by iterating between the macroeconomic and microsimulation models and the conventional revenue estimate put revenue feedbacks at $295.5 billion—a difference of less than $1 billion over 10 years.

This difference was more substantial in a dynamic analysis of a flat-tax plan that broadened the personal and corporate income tax bases.[13] A comparison of the dynamic revenue estimate from the macro-

10. See also Altschuler *et al.*, "The Role of Dynamic Scoring in the Federal Budget Process."

11. For additional details, see Tracy L. Foertsch and Ralph A. Rector, "Calibrating Macroeconomic and Microsimulation Models to CBO's Baseline Projections," *The IRS Research Bulletin: Recent Research on Tax Administration and Compliance*, Publication 1500, forthcoming 2007. A more detailed working-paper version is available upon request.

economic model and the conventional revenue estimate put revenue feedbacks at $968.2 billion over 10 years. A comparison of the dynamic revenue estimate obtained by iterating between the macroeconomic and microsimulation models and the conventional revenue estimate put revenue feedbacks at $768.1 billion. Thus, accounting for disaggregation by taking estimates of the change in federal individual income taxes from the microsimulation model reduced revenue feedbacks by about $200 billion.[14]

What kinds of dynamic estimates should the OTA provide? Tax proposals can include individual provisions that affect the economy in different ways. Dynamic analysis should help policymakers identify the macroeconomic and dynamic revenue effects of a proposal's key provisions.

Such an approach to dynamic analysis is not the norm. The JCT has typically analyzed proposed changes in current tax law only in aggregate. The CBO lumps all proposed changes in taxes *and* spending into a single package in its annual dynamic analysis of the President's budget.

However, for the FY 2007 *Mid-Session Review*, the OTA decomposed the President's proposal to extend permanently some of EGTRRA's and JGTRRA's expiring provisions into three separate components. The OTA first did a dynamic analysis of only a permanent extension of JGTRRA's preferential rates on capital gains and dividend income. It then layered onto that a dynamic analysis of an extension of EGTRRA's lower marginal rates on ordinary income. Finally, the OTA performed a dynamic analysis of a package that included not just EGTRRA's and JGTRRA's lower rates on capital gains, dividend income, and ordinary income, but also EGTRRA's provisions primarily affecting after-tax income.

Treasury could build on this approach. A new Dynamic Analysis Division could evaluate and rank individual provisions of proposed changes in current tax law by their effects on key economic indicators like GDP, labor, capital, investment, and consumption. The choice of economic indicator could vary with the objective of either the individual provision or the proposal in aggregate—e.g., a short-run aggregate-demand stimulus or a long-run increase in labor and capital. The ranking of the provision could vary with assumptions made about monetary and fiscal policies.

A new Dynamic Analysis Division could also rank individual provisions on the basis of their revenue effects. The OTA's dynamic analysis for the FY 2007 *Mid-Session Review* focused only on the macroeconomic effects of the President's tax proposals. However, the CBO and the JCT already regularly translate the macroeconomic effects of tax proposals into revenue feedbacks. Treasury could use estimates of economic outcomes from its macroeconomic models to produce similar measures of the dynamic budget effects of key provisions of proposed changes in tax policy.

Conclusion

A Dynamic Analysis Division in the OTA could build on and expand work already underway at the

12. See Tracy L. Foertsch and Ralph A. Rector, "A Dynamic Analysis of Permanently Extending EGTRRA and JGTRRA: An Application of a Coordinated Calibration of Macroeconomic and Microsimulation Models," *The 15th Federal Forecasters Conference—2006: Papers and Proceedings*, forthcoming 2007. For a longer working-paper version of this publication, see Tracy L. Foertsch and Ralph A. Rector, "A Dynamic Analysis of the 2001 and 2003 Bush Tax Cuts: Applying an Alternative Technique for Calibrating Macroeconomic and Microsimulation Models," Heritage Foundation *Center for Data Analysis Report* No. CDA06–10, November 22, 2006, at *www.heritage.org/Research/Taxes/upload/CDA_06-10.pdf* (November 27, 2006).
13. See Tracy L. Foertsch and Ralph A. Rector, "Economic and Budget Effects of a Two-Period Revenue Neutral Flat Tax," unpublished working paper, August 2006.
14. Two separate tax models were actually used in this analysis: a microsimulation model of the federal individual income tax and a corporate income tax calculator. Just a little under $110 billion separated the dynamic estimate of corporate income tax revenues obtained from the macroeconomic model and the income-adjusted estimate of corporate income tax revenues obtained by iterating between the macroeconomic model and the corporate tax calculator. A little over $200 billion separated the dynamic estimate of personal income tax revenues obtained from the macroeconomic model and the income-adjusted estimate of individual income tax revenues obtained by iterating between the macroeconomic and microsimulation models.

CBO and the JCT. It could enhance both the budget process and our understanding of the interactions of taxes and the macroeconomy by:

- **Maintaining** the mix of macroeconomic models needed to analyze a variety of proposed changes in tax policy (e.g., tax policy changes meant to stimulate consumption or investment in the short run and tax policy changes meant to increase the supply of labor or capital in the long run);
- **Exploring** the extent to which disaggregation influences estimates of the macroeconomic and dynamic revenue effects of a tax policy change; and
- **Reporting** the macroeconomic and dynamic revenue effects of the important provisions of proposed changes in tax policy.

However, the Treasury Department is unlikely to undertake this work without congressional approval of funding for a Dynamic Analysis Division. With not many days remaining before this Congress adjourns, time is running out.

—Tracy L. Foertsch, Ph.D., is a Senior Policy Analyst in the Center for Data Analysis at The Heritage Foundation.