

Practical Aspects of Dynamic Revenue Estimation

By Martin A. Sullivan

Martin A. Sullivan is a contributing editor with Tax Analysts. He served as a staff economist at the U.S. Treasury Department's Office of Tax Analysis from 1986 through 1988 and the congressional Joint Committee on Taxation from 1988 through 1992. The views presented in this report do not necessarily represent those of Tax Analysts. The author would like to thank David Burton for his many useful comments on an earlier draft.

I. Introduction

A. The Difference Made by a Dozen Years

If lawmakers are going to increase economic growth through tax policy, the most promising approach is adjustment of tax laws in a manner that will increase national saving. In 1991, when it seemed that all of official Washington was in a fury to use tax policy to improve U.S. competitiveness,¹ the Joint Committee on Taxation sifted through the possibilities and gave priority to the role of saving in economic growth:

Increases in the U.S. savings rate, either through increased private saving or decreased public borrowing, increase the future standard of living of the United States because current consumption is traded for future consumption. . . . The most direct way for government to affect the level of saving in the economy is by reducing public borrowing (that is, by reducing the Federal deficit). The government may also be able to affect private savings by changing tax policies. However, *tax policy changes*

*that increase private saving but also increase the federal budget deficit may not increase total national saving.*² [Emphasis added.]

The JCT was making a statement of elementary economics, but the idea that tax cuts designed to increase saving could actually reduce it was absent from the general political discourse. The JCT's attempt to highlight the problem was therefore noble but of questionable effectiveness in influencing policy. At the time, it was only an idea — an idea that politicians could ignore if it did not support their objectives.

Furthermore, there was no quantitative analysis to accompany the claim. Politicians, like most other people, seem more inclined to take notice of numerical estimates than mere concepts. And on the all-important issue of the effect of tax law changes on saving and economic growth, the JCT in 1991 had little to offer in terms of specifics.

By 2003, however, that had all changed. The JCT is now able to provide a quantitative answer to the all-important economic question of real-world tax policy-making: What is the effect of major tax legislation on long-term economic growth? In a May 8, 2003, report mandated by a new House rule,³ the JCT wrote:

The stimulus [provided by the House version of the 2003 tax cut] is reduced over time because the consumption, labor, and investment incentives are temporary, and because *the positive business incentives arising from the tax policy are eventually likely to be outweighed by the reduction in national savings due to increasing Federal government deficits.*⁴ [Emphasis added.]

²Joint Committee on Taxation, *Factors Affecting the International Competitiveness of the United States*, JCS-6-91, May 30, 1991, p. 13 (emphasis added).

³Martin A. Sullivan, "Mandated JCT Report Says House Bill May Hurt Economy," *Tax Notes*, May 19, 2003, p. 948.

⁴Joint Committee on Taxation, "Macroeconomic Analysis of H.R. 2, the 'Jobs and Growth Tax Act of 2003,'" *Congressional Record*, May 8, 2003, pp. H2829-H2832 (emphasis added). This analysis was produced by the JCT and inserted into the *Record* by Ways and Means Committee Chair William M. Thomas, R-Calif., pursuant to House Rule XIII.3(h)(2), which states: "(A) It shall not be in order to consider a bill or joint resolution reported by the Committee on Ways and Means that proposes to amend the Internal Revenue Code of 1986 unless: (i) the report includes a macroeconomic impact analysis; (ii) the report includes a statement from the Joint Committee on Internal Revenue Taxation explaining why a macroeconomic impact analysis is not calculable; or (iii) the chairman of the Committee on Ways and Means causes a macroeconomic impact analysis to be printed in the Congressional Record before consideration of the bill or joint resolution. (B) In subdivision (A), the term 'macroeconomic impact analysis' means: (i) an estimate prepared by the Joint Committee on Internal Revenue Taxation of the

(Footnote continued on next page.)

¹From June through September of 1991, House Ways and Means Committee Chair Dan Rostenkowski, D-Ill., held many hearings on competitiveness. Along with the usual academics and industry lobbyists, witnesses testifying at the hearings included the speaker of the house; the secretaries of Treasury, Commerce, and Education; the chair of the Federal Reserve Board; the United States Trade representative; and the chairs of several major U.S. corporations.

Although the differences in wording between the 1991 and 2003 statements are subtle, the change reflects a world of difference in the JCT estimating capabilities between 1991 and 2003. Using macroeconomic models, the JCT can now say something important and something it has never said before: In all likelihood, the positive effects of tax cuts do not outweigh the negative effects of larger deficits.

That powerful policy statement is just one application of new revenue-estimating technology. The JCT now has numbers to back its statements about all types of relationships between tax policy and growth. Even though House Ways and Means Committee Chair William M. Thomas, R-Calif., as the legislation's principal author, was probably disappointed by the specific results of the JCT estimate, he did recognize the larger implication of the JCT analysis: "This report, the first such analysis by a congressional office, is a major milestone in an effort to provide supplemental information for an educated policy debate on the effects of tax policy on the economy."⁵

B. First Explorations Into Dynamic Analysis

A lot happened between 1991 and 2003 that allowed the JCT to provide quantitative macroeconomic analysis of tax policy. The most important development was that in 1995 Republicans took control of both houses of Congress. Almost immediately a new Republican majority began to investigate the revenue-estimating process and to explore the possibility of expanding the scope of economic analysis in revenue estimates. Republicans were hopeful that the JCT would add "macroeconomic feedback effects" to standard static revenue estimates. That would allow the JCT to produce "dynamic revenue estimates."

Using macroeconomic models, the JCT can now say something important and something it has never said before: In all likelihood, the positive effects of tax cuts do not outweigh the negative effects of larger deficits.

The practical implications of dynamic revenue estimates for the tax legislative process could be substantial.

changes in economic output, employment, capital stock, and tax revenues expected to result from enactment of the proposal; and (ii) a statement from the Joint Committee on Internal Revenue Taxation identifying the critical assumptions and the source of data underlying that estimate." House Rules of the 108th Congress, adopted January 7, 2003, with the passage of H.R. 5.

⁵Letter to colleagues from Ways and Means Committee Chair William M. Thomas regarding the JCT macroeconomic analysis of H.R. 2, *Doc 2003-12089*, 2003 TNT 93-18, May 13, 2003. Not surprisingly, Ways and Means ranking minority member Charles Rangel, D-N.Y., also endorsed the JCT's work: "A lot of time, talent and money have now been spent on successive dynamic analysis by CBO and now the Joint Committee on Taxation. Let's respect the conclusions." Letter to colleagues from Ways and Means ranking minority member Charles B. Rangel, *Doc 2003-12150*, 2003 TNT 94-19, May 12, 2003.

If feedback effects are large, the use of dynamic estimation could significantly affect the size, composition, and very existence of future tax legislation.

In particular, the fate of fundamental tax reform proposals — popular among Republicans — was closely related to the issue of dynamic revenue estimation. Most of those proposals involved converting the current tax system (which is a hybrid income-consumption tax) to a pure consumption tax. Because consumption taxes are not biased against saving and investment as income taxes are, there is general agreement among economists that that type of switch would increase economic growth. If official revenue estimators would take that growth (and concomitant revenue increases) into account, lawmakers could simultaneously reform and cut taxes without increasing estimated deficits. Depending on the size of the estimated growth effect, that could greatly increase the political likelihood of fundamental reform.

A joint hearing of the House and Senate Budget committees held in early January 1995 put a damper on this initial enthusiasm. The consensus that emerged at that time was that economists in general and the JCT in particular were not up to the challenge of including macroeconomic effects in revenue estimates used by Congress.

The comments of two Republicans were particularly discouraging to advocates of dynamic revenue estimation. Newly appointed JCT Chief of Staff Kenneth J. Kies, in his first public appearance in his new job, argued against dynamic revenue estimation:

Because of the complexity and lack of consensus as to the measurement of such macroeconomic effects, attempting to take macroeconomic consequences into account could undermine the credibility of the estimating process and render estimates less reliable. The uncertainty of monetary policy further contributes to this problem.⁶

At the same hearing, the venerated chair of the Federal Reserve Board, Alan Greenspan, also voiced skepticism about the practicality of dynamic scoring:

Full dynamic estimates of individual budget initiatives should be our goal. Unfortunately, the analytical tools required to reach it are deficient. In fact, the goal may ultimately be unreachable. The estimation of full dynamic effects requires a model that both captures micro- and macroeconomic processes and produces reliable long-run forecasts of economic outcomes. Unfortunately, no such model exists. . . . We must avoid resting key legislative decisions on controversial estimates of revenues and outlays.⁷

⁶Joint Committee on Taxation, "Written Testimony of the Staff of the Joint Committee on Taxation Regarding the Revenue Estimating Process for the Joint Hearing of the House and Senate Budget Committees of the 104th Congress on January 10, 1995," JCX-1-95, Jan. 9, 1995.

⁷Alan Greenspan, "Testimony Before the Joint Hearing of the Senate and House Budget Committees on the Budget," Jan. 10, 1995.

Despite the initial negative assessment, the JCT continued its investigation of dynamic estimation. In 1996 the staff organized a blue-ribbon panel of macroeconomists and public finance economists with experience in building empirical economic models that measure the effects of tax law changes on the economy.

During their deliberations, the panel and JCT staff conducted more research and developed more expertise, but the most noticed outcome of their work was that the various models employed produced many results because of structural differences in the models and different assumptions about the behavioral responses of individuals and businesses to tax changes. In its final report on the panel's deliberation, the JCT itself concluded:

The range of results from the simulations . . . is indicative of the fact that there is no clear consensus within the economic profession as to the correct way to model and forecast the effects of tax policy changes on the macroeconomy. While the profession is in general agreement as to the direction of effects of certain types of changes once the economy has had time to adjust (has reached long-run equilibrium in the models), it is not yet able to model these changes precisely on a yearly basis, particularly in the short-run, when the economy is not yet in equilibrium.⁸

The assertion made by conference participant Alan J. Auerbach, a Berkeley economics professor and former JCT deputy chief of staff, in 1995 testimony to the Senate Finance Committee seemed vindicated by the conference: "The most serious problem in the application of dynamic revenue estimation is the uncertainty surrounding the estimates."⁹

C. State Experience

While the debate on dynamic revenue estimating continued on the federal level, many states were already developing experience with dynamic revenue-estimating techniques.

Massachusetts was the first state to use dynamic estimating on a routine basis. By 1993 it had a fully developed model that linked a traditional microsimulation model (that calculates static revenue effects) to a macroeconometric model (that calculates dynamic revenue effects).¹⁰ Massachusetts's dynamic model, designed by the accounting firm then known as PriceWaterhouse, was not developed under legislative mandate, and its use created political problems.

Reports suggest that Gov. William Weld (R) was selective in his use of the dynamic model's results. It was discovered that when the Massachusetts estate tax was reduced in 1992, the administration ignored the Department of Revenue's report that the tax cut would lose \$100

million.¹¹ Those political problems were significant because they hurt the credibility of the Massachusetts DOR. Eventually, Massachusetts discontinued dynamic modeling of tax changes indefinitely.

In August 1994 California approved legislation that requires revenue estimators in the Legislative Analyst's Office and the Department of Finance to incorporate dynamic responses in their estimates of revenue proposals.¹² By 1996, after hiring additional staff and contracting with economists at the University of California at Berkeley, the California Department of Finance had built a model that could estimate dynamic effects and was using it to analyze revenue proposals from the governor and from the legislature.¹³

In 1999 the Texas comptroller's office began offering dynamic tax impact analyses of selected proposals being considered by the Texas Legislature. Using a Texas-specific general equilibrium model, the Revenue Estimating Division of the Office of the Comptroller estimates the budgetary impact of policy proposals that have a static estimated cost greater than \$100 million.¹⁴

A recent survey of state governments reported that, in addition to California and Texas, eight other states performed dynamic revenue analysis: Arizona, Arkansas, Georgia, Louisiana, New York, Oregon, West Virginia, and Wyoming.¹⁵

D. JCT Model Building and 2002 Hearings

After the conclusion of the JCT's 1997 symposium, and while many states were gaining more experience with dynamic revenue estimation, the JCT went to work in earnest to develop its own macroeconomic models. It

¹¹Frank Phillips and Scot Lehigh, "No Evidence of Gain From '92 Tax Cut," *The Boston Globe*, Mar. 15, 1995.

¹²California SB 1837, Chapter 383, was signed into law by Gov. Pete Wilson (R) on Aug. 30, 1994. The text of the statute applying to the Department of Finance reads: "To the extent that any fiscal impact estimate prepared by the Department of Finance involves one or more proposed changes in state tax law, the department shall prepare the estimate, except where it is unreasonable to do so, on the basis of assumptions that estimate the probable behavioral responses of taxpayers, businesses, and other citizens to those proposed changes, and shall include in the fiscal impact estimate a statement identifying those assumptions. The requirement set forth in this section shall apply only to a proposed change in state tax law determined by the Department of Finance, pursuant to a static fiscal estimate, to have a fiscal impact in excess of ten million dollars (\$10,000,000) in any one fiscal year."

¹³Peter Berck, Elise Golan, and Bruce Smith, "Dynamic Revenue Analysis in California: An Overview," *State Tax Notes*, Oct. 28, 1996, p. 1227.

¹⁴Bill Peacock, "Rylander Implements Dynamic Analysis," *The Houston Review*, June 5, 1999.

¹⁵Mickey Hepner and W. Robert Reed, "Dynamic Scoring in the Public and Private Sectors: Final Report," study commissioned by the World Council on Economic Policy for The Heritage Foundation, Mar. 21, 2003.

⁸*Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997.

⁹Alan J. Auerbach, "Government Revenue Estimation: Problems and Potential Solutions," testimony before the Committee on Finance, U.S. Senate, Jan. 24, 1995.

¹⁰Alan Clayton-Matthews, "The Massachusetts Dynamic Analysis Model," *State Tax Notes*, Sept. 20, 1993, p. 639.

COMMENTARY / REVENUE ESTIMATING PROCESS

contracted for services of outside consultants with expertise in macroeconomics, including the firm of Macroeconomic Advisors LLC. It also dedicated some staff to work part-time on dynamic estimating.¹⁶

The most notable outcome of those efforts was the development of an in-house model for use in analyzing the macroeconomic effects of tax proposals. That model is a macroeconomic equilibrium growth model that became known as the "MEG" model. Like most sophisticated commercial macroeconomic models, MEG¹⁷ can be used to analyze both long-run equilibrium growth effects (using a largely neoclassical economic framework) and short-run disequilibrium adjustments (using a Keynesian¹⁸ framework) resulting from proposed changes in tax policy.

In 2002 the JCT organized a second blue-ribbon panel¹⁹ to review its macroeconomic models, suggest model improvements, and provide advice on the type of information that should be included in dynamic analyses. The JCT convened two meetings of the panel in 2002. According to a December 2002 press report, some members of the blue-ribbon panel believed a written report on the panel's work might be imminent, but as of October 2003 no report had been released by the JCT.²⁰

Also in 2002, Congress held a cluster of hearings in May to assess yet again the viability of dynamic revenue estimating and the JCT's progress.²¹ It is hard to argue against more information, so it should not come as any surprise that there is near unanimity among economists that the *idea* of dynamic revenue estimation is *theoretically* correct. The three most prominent witnesses at those May 2002 hearings shared this view.

- CBO Director Dan L. Crippen told the House Budget Committee that "information about macroeconomic effects of proposed legislation and the implications of those effects for the budget may often be useful in the legislative process."²²

¹⁶"Three JCT economists have devoted significant amounts of their time to the effort." Joint Committee on Taxation, "Written Testimony of the Staff of the Joint Committee on Taxation at a Hearing of the Subcommittee on Oversight of the House Committee on Ways and Means Concerning Modeling the Economic Effects of Changes in Tax Policy," JCX-36-02, May 6, 2002.

¹⁷The starting point for development of MEG was the Macroeconomic Advisors model.

¹⁸In 1936 British economist John Maynard Keynes (1883-1946) published his profoundly influential work, *The General Theory of Employment, Interest, and Money*. In that book, Keynes argued that business cycles were due to short-term fluctuations in an economy's aggregate demand.

¹⁹"JCT Blue Ribbon Advisory Panel List," Doc 2002-22897, 2002 TNT 196-44, Oct. 7, 2002.

²⁰Warren Rojas, "Dynamic Scoring Report Coming Soon?" *Tax Notes*, Dec. 16, 2002, p. 1401.

²¹Martin A. Sullivan, "Hearings on Dynamic Scoring Are Anything but Dynamic," *Tax Notes*, May 13, 2002, p. 955.

²²Congressional Budget Office, "Testimony of CBO Director Dan L. Crippen Before House Budget Committee Hearing on Role of CBO," May 21, 2002. All quotes below that are attributed to Crippen are taken from this testimony.

- Similarly, JCT Chief of Staff Lindy L. Paull told the Ways and Means Oversight Subcommittee that "Certain changes in tax policy may be expected, and in some cases may be designed, to affect the strength or growth of the national economy. For such a proposal, a standard revenue estimate may not convey the complete picture of the long-term budgetary impacts of the proposal."²³

- At the same Ways and Means hearing, the chair of the president's Council of Economic Advisers (CEA), R. Glenn Hubbard, said it succinctly: "The idea of dynamic scoring is conceptually correct."²⁴

The crux of the problem with dynamic revenue estimating is the *practicality* of doing dynamic estimation. The JCT, which already must provide thousands of revenue estimates each year, is always glad to highlight the difficulties encountered with implementation of dynamic revenue estimation, and the 2002 hearings were no exception. Paull told members:

There are a variety of issues giving rise to this uncertainty and each issue raises serious problems with respect to the reliability of the estimates of the timing and the magnitude of any potential macroeconomic effect. The validity and utility of any estimates of macroeconomic effects remain subject to question until these issues are addressed. . . . The difficult issues presented in developing the ability to incorporate macroeconomic effects in revenue estimates should not be minimized.

Hubbard concurred with Paull: "In practice estimating these steps [to do a dynamic analysis] is fraught with difficulty." Crippen gave the most pessimistic assessment: "Integrating dynamic scoring into the cost estimates would pose intractable problems."²⁵

Despite their professional judgment regarding the practicality of dynamic estimation, those seasoned Republican appointees could not ignore political pressure for them to pay greater attention to the macroeconomic effects of tax proposals. In their testimony, they pointed out that macroeconomic analysis of revenue proposals served two purposes: (1) potentially to improve the accuracy of revenue estimates and (2) to provide general policy analysis.

²³Joint Committee on Taxation, "Testimony of JCT Chief of Staff Lindy L. Paull Before Joint Committee on Taxation," JCX-36-02, May 2002. All quotes below that are attributed to Paull are taken from this testimony.

²⁴R. Glenn Hubbard, "Testimony of Council of Economic Advisers Chair Before Subcommittee on Oversight of House Ways and Means Committee," President's Council of Economic Advisers, May 7, 2002. All quotes below that are attributed to Hubbard are taken from this testimony.

²⁵Similar ideas were reported from participants who were queried after the meeting. "In terms of scoring," said panel member William Gale, "I think we are a long, long way off. In terms of analysis that is timely and accurate and fairly represents the range of professional opinion . . . we're probably a little bit closer." See Warren Rojas, "Economists Praise 'Constructive' Scoring Exchange," *Tax Notes*, Oct. 14, 2002, p. 191.

Crippen, Paull, and Hubbard each offered what is basically the same compromise, punting the first objective while embracing the second: Staff economics should provide estimates of dynamic effects, but those estimates would be kept separate and distinct from the estimates used in making the budget. As Hubbard told the committee: "There is no need to embed dynamic scoring in the existing budget process." Crippen urged separate reports about macroeconomic impacts. The JCT proposed calling those separate analyses "macroeconomic feedback notes."²⁶ Hubbard would refer to them as "impact statements."

E. Objectives of This Study

In a study released in January 1995 (just as Republicans were beginning to assert control of Congress), the CBO wrote that if Congress wanted to inject a greater amount of macroeconomic analysis into the legislative process, there were three choices:²⁷

- **Qualitative information only.** Congressional economists could provide qualitative information about macroeconomic effects and budgetary feedbacks of proposed legislation. That information could include likely long-run effects of proposed legislation as well as effects during the transition to that long run. The CBO rightly pointed out that those analyses, formally detached from the revenue estimates used by Congress, might have limited effect: "Any information that was presented in a separate report rather than as part of a cost estimate would have less impact than the estimate itself."
- **Quantitative supply-side effects.** Congressional economists could produce dynamic estimates that included quantitative measures of macroeconomic feedback, but only that which arises from supply-side effects. Under that approach, the CBO explained, estimators would have to estimate how policy changes would affect the supplies of labor and capital, how those changes would affect potential gross domestic product, and then how those changes would affect government revenues and expenditures.

The CBO understood that under that approach — as in the case of any practical revenue estimating exercise — short cuts at the expense of theoretical purity would be needed: "In practice, the estimators

would have to simplify their task by creating rules of thumb that would encompass some of the most important effects, rather than trying to run exhaustive simulations of the structural effects of each proposal." Even with rules of thumb and the exclusion of demand-side effects, however, that approach would be no cakewalk. The CBO acknowledged that substantial additional work would be needed, that delays could arise in the legislative process, and that it might not be possible to develop rules of thumb to cover all situations.

- **Quantitative supply-side and demand-side effects.** Economists could produce dynamic estimates that included feedback effects from both the supply and demand sides of the economy.

The above-quoted public statements by Crippen, Paull, and Hubbard in 2002 are consistent with the *first* alternative put forward by the CBO in 2002. At the same time, the JCT has devoted a great deal of effort to development of its MEG model, which includes both demand-side and supply-side elements. The JCT's development of the MEG model is consistent with the *third* alternative put forward by the CBO.

The premise of this report is that — despite their personal prestige and that of the organizations they led at the time — the conclusions reached by Crippen, Paull, and Hubbard should not be treated as gospel. This report will explore the possibility that congressional economists can compute useful estimates of macroeconomic effects of tax proposals in a manner sufficiently timely and that they can be incorporated into the usual scorekeeping procedures.

To that end, this report explores the *second* of the three alternative methods suggested by the CBO for implementing macroeconomic analysis. The elimination of estimates of demand-side effects of taxes on the economy is a major simplification. Although the JCT itself appears to have dismissed that approach,²⁸ it is hardly unusual. For example, at the 1997 JCT symposium on dynamic revenue estimating, six of the nine models presented did not include any demand-side effects. For its recent estimate of the effect of the president's budget proposal for fiscal 2004, the CBO used six models, four of which did

²⁶Here is the full JCT proposal as described in Paull's testimony: "In the near future, the Joint Committee staff expect [sic] to be able to produce comparative analyses of the long-term growth and associated revenue feedback effects of major tax proposals, and to attach 'macroeconomic feedback notes' containing this analysis to revenue estimates of those proposals for which such a note is clearly indicated. This analysis would include a description of the major assumptions used to produce the analysis, as well as a discussion of the degree of certainty associated with the results." Joint Committee on Taxation, "Written Testimony of the Staff of the Joint Committee on Taxation at a Hearing of the Subcommittee on Oversight of the House Committee on Ways and Means Concerning Modeling the Economic Effects of Changes in Tax Policy."

²⁷Congressional Budget Office, *Budget Estimates: Current Practices and Alternative Approaches*, January 1995.

²⁸The JCT raises and dismisses the possibility of focusing exclusively on the supply side. The quote from the JCT that follows offers one justification for the supply-side-only argument and a rebuttal to that single argument: "It has been suggested by some that it is neither necessary nor desirable to model these demand side disruptions. They argue it is not necessary because one can assume, on average, that the Fed will apply monetary policy options to maintain full employment. . . . The assumption that the Fed will try to maintain a full employment economy in the face of major tax reform is neither a completely foregone conclusion nor a guarantee that anything close to full employment will be achieved in the short run." *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, p. 37. The JCT then implies that legislators would be shortchanged by a supply-side-only approach: "It is important in the budget process to convey the possibility of major economic disruptions in the short run, because the short run is precisely the time frame considered formally in the legislative process."

not include any demand-side effects.²⁹ And in their study of the economic effects of the Economic Growth and Recovery Reconciliation Act of 2001, William Gale and Samara Potter compute only supply-side effects.³⁰

This report also attempts to focus on the process of dynamic revenue estimation. Model development, including the choice of critical behavioral elasticities, is a difficult task, but it can be completed well before any dynamic estimates are generated. It would not be an issue that estimators working in the trenches would have to deal with on a day-to-day basis. The central issue for keeping the turnaround time on individual estimates at acceptable levels is streamlining the translation of a proposal's features into "language" that economic models can understand. Therefore, unlike other studies that tend to emphasize choices of models and elasticities, this report focuses on the practical problem of bridging the gap between static estimates and the determination of macro model inputs.

Part II of this report discusses why the omission of demand-side analysis does not do any serious harm. Part III overviews the significant economic features of a simple aggregate supply model. Part IV examines the practical aspects of implementing such a model. Part V provides concluding remarks.

II. Discarding the Demand Side

A. Introduction

To economists, estimating the dynamic effects of a tax policy means crossing the divide from microeconomics to macroeconomics. The land of macroeconomics is in turn separated into two distinct regions: the demand side and the supply side. The demand side is focused on the economy's short-term cyclical fluctuations. The supply side is concerned with long-term economic growth. It is common practice in economic research to consider only one side or the other at one time. The most famous branch of macroeconomics — known as Keynesian economics — focuses almost exclusively on the demand side.

Keynesian economics emphasizes the impact of taxes on consumer spending and business investment in the short run. When politicians express their desire to fight recessions and provide economic stimulus, they are expressing purely Keynesian ideas. According to the Keynesian view, recessions are the result of declines in aggregate demand. To fight recessions, governments should undertake expansionary tax and spending pro-

grams that will stimulate aggregate demand. Almost always,³¹ those policies entail increases in government deficits.

Although Keynesian economics is still taught in introductory and intermediate economics classes, and although popular economics — as expounded by many journalists and politicians — continues to be chock full of Keynesian principles, demand-side macroeconomic policies are in widespread disrepute among academic economists. This report argues that aggregate demand effects of government policies should be excluded from macroeconomic analyses used in the dynamic revenue estimating models.

To those who monitor debates on tax policy but are unaware of developments in academic macroeconomics, that may at first seem like a radical curtailment of the scope of dynamic estimation. The following section, which summarizes some of the academic and political developments surrounding Keynesian economics since the 1960s, will help readers to understand how far apart popular and academic conceptions of Keynesian economics are and why the omission of Keynesian effects would not be a serious shortcoming in dynamic revenue estimating models.

B. The Decline of Demand-Side Macroeconomics

Throughout the 1960s and early 1970s, it was widely assumed that federal fiscal policy, if skillfully administered, could reduce unacceptably high unemployment with little impact on inflation.³² At that time, economists took it for granted that a tax cut could substantially increase aggregate demand — particularly through increases in consumer spending. Today, however, there is much less agreement about that claim. Since the 1960s, many developments have led most academic economists to believe that Keynesian policies are ineffective.

Even as early as 1968, future Nobel Laureate Milton Friedman argued that government policies might be able to reduce unemployment in the short run but would be unsuccessful in having any lasting effects. Moreover, any short-term benefits in employment would come at the expense of inflation. In 1976 Robert Lucas, another future Nobel Laureate, argued that systematic government economic policies could not reduce unemployment even in the short run.

³¹There are "balanced budget" policies that can deliver a relatively modest fiscal stimulus in a Keynesian framework. Those include (1) an increase in government spending offset by a tax increase of an equal dollar amount and (2) a redistribution of the tax burden from high-income families to low-income families.

³²The heyday of Keynesian economics was the 1960s, when economists such as Yale Nobel Laureate James Tobin advised the Kennedy administration on how to avoid recessions by enlarging the federal deficit. The overwhelming majority of Keynesian economists were liberal, which should not be surprising because Keynesian economics can readily be used to justify increased government spending as well as tax cuts geared toward the poor. The Council of Economic Advisers' 1962 *Economic Report of the President* makes a strong case for Keynesian policy.

²⁹The estimates first appeared in Congressional Budget Office, *Analysis of the President's Budgetary Proposals for Fiscal Year 2004*, March 2003. An explanation of the estimates was provided in CBO, *How the CBO Analyzed the Macroeconomic Effects of the President's Budget*, July 2003.

³⁰William G. Gale and Samara R. Potter, "An Economic Evaluation of the Economic Growth and Tax Relief Reconciliation Act of 2001," *National Tax Journal*, March 2002, pp. 133-186.

Those critiques — known respectively as “monetarism” and “rational expectations monetarism” — were bitterly disputed when they were first put forward. They are now widely accepted by academic economists. For some reason, however, they do not seem to have penetrated the bubble of hot air over the Washington Beltway.

By 1990 N. Gregory Mankiw — now chair of President Bush’s Council of Economic Advisers — noted that although the press and policymakers still clung to the 1970-vintage “consensus” view that activist government policy to fight recessions, academic economists had discarded it:

Today, macroeconomists are much less sure of the answers. The [standard Keynesian] model rarely finds its way into scholarly journals; some economists view the model as a relic of a bygone age and no longer bother to teach it. The large-scale macroeconomic models are mentioned only occasionally at academic conferences, often with derision.³³

Mankiw further observed that the breakdown in the consensus was due to both empirical and theoretical shortcomings of standard macroeconomics.³⁴ The empirical problem was that the simultaneous increase in infla-

tion and unemployment during the 1970s violated the fundamental Keynesian notion that there was a trade-off between inflation and unemployment. The theoretical problem was that Keynesian models were largely inconsistent with microeconomic principles that were more conducive to mathematical formulation and were becoming more popular in an economics profession increasingly dominated by mathematics.

Even the most hard-boiled of Keynesians are likely to acknowledge that any increase in aggregate demand resulting from government fiscal policy is likely to increase interest rates and reduce credit availability due to increased government borrowing. Such a credit tightening is likely to reduce business investment and personal consumption expenditures. The interest-sensitive housing and consumer-durables sectors are likely to be the hardest hit. Credit-sensitive small-business investment would also be vulnerable. Finally, U.S. exports could suffer. (Higher domestic interest rates attract foreign investment, resulting in appreciation of the dollar, which in turn raises the price of U.S. exports.)

Even if there were no such “crowding out” in credit and foreign exchange markets, many economists still believe that fiscal policy cannot stimulate aggregate demand because individuals are smart enough to realize that current stimulus must be funded by future tax increases. Because the present value of future tax increases equals the current value of the tax cut, consumers in the aggregate are not stirred to increase demand. In “econo-speak,” this proposition is known as “Ricardian equivalence” (after British economist David Ricardo, 1772-1823).

By the time Ronald Reagan ascended to the presidency, Republicans who favored noninterventionist and supply-side policies had marginalized Keynesian notions. The president’s Council of Economic Advisers summarized the prevailing view in the 1986 *Economic Report of the President*:

Little evidence supports the efficacy of either monetary or fiscal policy for short-term fine-tuning of the macroeconomy. In principle, discretionary short-term adjustments to emerging market conditions appear to be a reasonable approach to policy-making. In practice, however, the lags in economic policy, as well as lack of reliable information about the dynamic path of the economy, imply that policy actions designed in response to evolving economic conditions can be destabilizing. In some instances, actions undertaken to fine-tune the economy may turn out to be appropriate; but such policies rely on a high degree of luck to succeed and typically do not minimize the risk to economic performance.³⁵

Liberal-leaning economists were less willing to adopt some of the more aggressive postulates of supply-side economics, but most had to concede a much-diminished role for Keynesian economics. The following quote is

³³N. Gregory Mankiw, “A Quick Refresher Course in Macroeconomics,” 28 *Journal of Economic Literature*, 1645-1660 (Dec. 1990).

³⁴Donald Kiefer has also noted the rapid decline in the reputation of Keynesian macroeconomics: “The influence of Keynesian economics was at its peak during the early 1960s. The theory that enjoyed the widest support held that fiscal policy had powerful and nearly immediate effects, that the size and timing of a fiscal policy initiative could be adjusted to have almost exactly the intended effects, that the specific structure of a tax cut or spending program had little influence on its aggregate effects, and that the influence of monetary policy was limited. These beliefs led many economists to maintain that fiscal policy could (and should) be used to counter the business cycle. Some economists even went so far as to suggest that the business cycle had effectively been ‘repealed’ and that we never again need suffer the effects of a recession (or at least anything but a very mild recession). Today, fiscal policy is understood to be less powerful than was commonly believed in the early 1960s and to operate with fairly long lags. The effects of a fiscal policy initiative are thought to depend significantly on its structure. There is a greater appreciation of the difficulties of tailoring the size and timing of fiscal policies.” Donald Kiefer, “Tax Cuts and Rebates for Economic Stimulus: The Historical Record,” Congressional Research Service, January 2, 1991. Similarly in 1991, the JCT staff wrote: “In the 1960s and the 1970s, it was commonly assumed that government policies could reduce unacceptably high unemployment with little impact on inflation and that it might be possible to ‘fine tune’ the economy. That view of the possibilities of macroeconomic policy came into question in part because it is not supported by developments in macroeconomic theory and in part because the track record of discretionary fiscal policy reveals that in many cases policies intended to dampen business cycles actually contribute to destabilizing the economy. In contrast to its central role during the 1960s and 1970s, Keynesian economics played a relatively minor role in economic decisionmaking in the 1980s.” Joint Committee on Taxation, *Tax Policy and the Macroeconomy: Stabilization, Growth, and Income Distribution*, JCS-18-91, Dec. 12, 1991.

³⁵Council of Economic Advisers, *Economic Report of the President*, 1986, pp. 72-73.

from a recent book by two prominent economists with close ties to Democratic Party politicians:

Nothing in the history of the 1990s makes us at all optimistic about the feasibility of fiscal fine tuning. . . . At least in the United States, the federal budget-making process looks extremely cumbersome, highly politicized, and not terribly responsive to economic logic. . . . Among economists, there is an evolving tacit consensus that [aggregate] demand management should be left to monetary policy while fiscal policy is used as a long-run allocative tool.³⁶

C. A Resurgence of Keynesianism?

In the past few years, so-called neo-Keynesian economists have done a great deal of theoretical work to shrug off that and other criticisms by neoclassical economists who believe that the efficiency of markets obviates the need for activist economic policy. For example, they have shown that credit rationing and “sticky prices” make it conceivable that free markets do not work effectively. The implication of those developments is that there may be a role for government policy in helping to stabilize the economy.

Those clever theoretical advances by neo-Keynesians have done a great deal to make Keynesianism somewhat respectable again in academic circles, but the near total absence of empirical work has left policymakers no better off than they were two decades ago when it comes to the practical implementation of fiscal policy. As noted by Mankiw, “the macroeconomic research of the past 20 years has had little impact on applied economists. . . . Recent developments have just not been of the sort that can be quickly adopted by applied economists.”

Most important, there has been little work attempting to estimate the size of fiscal policy “multipliers.” If the government cuts taxes by \$50 billion, will it increase aggregate demand by \$25 billion or \$50 billion or \$100 billion (in which case the fiscal policy multipliers would be 0.5, 1.0, and 2.0, respectively)? In the heyday of Keynesian macroeconomics, it was common to hear of fiscal policy multipliers with a magnitude of three or four. In general, the economists of the 1980s and 1990s consider those estimates of the 1960s and 1970s to be overly optimistic.

Few economists are now willing to put themselves on the line with an actual numerical estimate. A survey of more than two dozen macroeconomic texts and articles written in the past decade yielded only a single empirical estimate of a fiscal policy multiplier.³⁷ In a 1992 review article, Mankiw reported on a 1983 estimate of a government purchases multiplier of “only about 0.6.”³⁸

D. Demand-Side Macroeconomic Policies

Even if economists agreed that tax cuts were effective stimulus, and even if they could measure effects of those policies with a fair degree of accuracy, there are still several major hurdles to overcome before Keynesian tax policies could be effective.

The goal of a Keynesian fiscal stimulus is to increase aggregate demand until it uses the full productive capacity of the economy. In practice, aggregate demand is measured by GDP and aggregate supply is estimated as “potential GDP.” (The gap between the two is sometimes called the “deflationary gap.”) Unfortunately, GDP figures are available from the Bureau of Economic Analysis of the Commerce Department with a lag of several months and then are subject to substantial revisions. Potential GDP is an economic concept that can never be measured precisely.

Thus, the first problem with practical implementation of Keynesian tax policy is that the size of the deflationary gap that the policy seeks to close is difficult to measure with any degree of precision. Stimulative policies that overshoot the mark are likely to be inflationary. In contrast, supply-side policies have no requirement that they hit a similar moving target or exceed an upper bound.

The problem that receives much more attention, and for which there is widespread agreement even among economists predisposed to Keynesian thinking, is timing. In practice, it is extremely difficult to provide macroeconomic stimulus in the trough of a recession when it is most needed.

The problem exists primarily because of many lags that prevent a timely policy shift.

First, as already noted, there is a *data* lag between actual economic events and the collection and publication of preliminary data. Furthermore, several months pass between the publication of preliminary and revised data, and then between the publication of revised and final data.

Second, there is a *recognition* lag for economists and politicians who need time to determine whether the data indicate that the economy is in a slowdown or a recession.

Third, there is a *legislative* lag — the time it takes Congress to pass legislation once the need for legislation is recognized.³⁹

Fourth, there is the *implementation* lag — the time it takes tax administrators to put policies into action (for example, the time it takes for the IRS to get tax rebate checks into the mail).

Finally, there is the *effectiveness* lag. It might take several months or even years for the positive effects of any tax change to change the behavior of taxpayers and then work their way through the economy.

³⁶Alan S. Blinder and Janet L. Yellen, *The Fabulous Decade: Macroeconomic Lessons From the 1990s*, Twentieth Century Fund, 2001.

³⁷Martin A. Sullivan, “Fiscal Stimulus: Are We Fighting the Last War?” *Tax Notes*, Oct. 15, 2001, p. 310.

³⁸N. Gregory Mankiw, “The Reincarnation of Keynesian Economics,” *European Economic Review*, April 1992, pp. 559-565.

³⁹Both the Kennedy administration and the Nixon administration tried to minimize problems with the legislative lag by proposing ways to streamline the approval of discretionary fiscal policies. See Council of Economic Advisers, *Economic Report of the President*, 1962, pp. 72-76, and *Economic Report of the President*, 1973, p. 75.

The average duration of a recession in the United States is less than one year. Those lags, in combination, can easily total more than two years. It should therefore come as no surprise that the track record of the timing of fiscal policy in the United States has been poor. The long and variable lags in short-run stabilization policy have prompted many economists to recommend that the government should avoid efforts to fine-tune the economy. In the words of Harvard economist Robert Barro, "It is best for government to provide an underlying stable framework and then mainly stay out of the way."⁴⁰

E. Conclusion

Although the economics of taxation is generally considered a branch of *microeconomics*, *macroeconomics* is central to the issue of dynamic revenue estimation. The objective of the above discussion has been to provide enough background to demonstrate that exclusion of demand-side effects is not an outlandish suggestion. Despite the fact that politicians in the White House and Congress repeatedly use Keynesian economics to justify their policies, the economics profession does not hold Keynesian economics in high esteem.

Keynesian effects are probably small, and they are highly uncertain. But even if they were large and certain, the federal government's macroeconomic track record leads to the conclusion that policymakers should not attempt to undertake an activist fiscal policy. Unlike supply-side policies, the efficacy of demand-side policies depends critically on timing.

Of course, it can be argued that the disparate treatment of demand-side and supply-side effects suggested here would create a budgetary bias favoring tax cuts that provide long-term, supply-side benefits vis-à-vis policies designed to give the economy a quick fix. That is a bias that most economists could probably live with and in fact would probably welcome. In the political sphere, that bias would be consistent with traditional Republican distaste for interventionist government policy. It is not likely to be poorly received by Democrats who have become increasingly interested in the long-term effects of government fiscal policies.⁴¹

III. Implementing the Supply Side

A. The Production Function

The backbone of the supply side of every macroeconomic model is its production function. According to this simple mathematical representation of the economy's production, output — usually measured as real⁴² GDP — increases when the supply of capital or the supply of labor increases. Tax policies intended to promote eco-

nommic growth are usually geared toward increasing the supply of labor or the supply of capital.

Like almost everything else in economics, economists are unsure of what mathematical equation (or — if disaggregated — equations) characterize the relationship between output and capital and labor. Although there are many possibilities, in practice the functional form that economists most often employ is known as the Cobb-Douglas production function:

$$Q = A K^b N^{(1-b)} \quad (1)$$

where K is the economy's capital stock, N is the amount of labor, and A is an autonomous growth factor usually attributed to technological change. (A is sometimes referred to as "the residual" because it is measured by residual changes in output that are not explained by changes in capital or labor).

The popularity of the Cobb-Douglas form is due to the belief among some economists that it is indeed the best way to characterize the economy (particularly over the long run) and to the ease with which the function may be used mathematically and the ease with which it may be interpreted. The exponents b and $1-b$ are the elasticities of real GDP regarding increases in capital and labor, respectively. The two exponents sum to one.⁴³ It turns out that b and $1-b$ are the fractions of total national income that may be attributed to capital and labor, respectively.

An alternative formulation of the Cobb-Douglas production function expresses *growth* in output as a function of the *growth* in technology, labor, and output:

$$q = a + bk + (1-b)n \quad (2)$$

where q is the growth rate in real output, a is the growth rate of technology, k is the growth rate of capital, and n is the growth rate of labor. According to the CBO, payments to owners of capital in the United States have averaged roughly 30 percent of total U.S. income since 1947. In that case, the Cobb-Douglas production function would have a value of 0.3 for b , suggesting that 1 percent growth in the capital stock leads to 0.3 percent growth in output. Similarly, an increase of 1 percent in the growth of hours worked leads to an increase of 0.7 percent in the growth of output.⁴⁴

The following section reviews six channels of influence, from changes in tax policy to changes in output. The first is the effect of tax policy on labor, and the remaining five are effects of tax policy on capital. In the following section, tax policy may affect the capital stock through its effect on private saving; on public saving (that is, the deficit); on business demand for plant and equipment; on the allocation of capital between the business and residential sectors; and on the allocation of capital between the corporate and noncorporate business sectors. Changes in the first three change the size of the capital stock. Changes in the last two affect the efficiency of the capital stock.

⁴⁰Robert J. Barro, *Getting It Right: Markets and Choices in a Free Society* (Cambridge, Mass.: MIT Press, 1997).

⁴¹In fact, the argument that government policies that reduce the deficit will lead to lower interest rates and a larger capital stock is often dubbed "Rubinomics" after Robert Rubin, secretary of Treasury (1995-1999) during the Clinton administration.

⁴²Without enhancements, supply-side models are not able to determine the price level and inflation. They often do not contain any financial or monetary sectors.

⁴³That gives the production function the characteristic of constant returns to scale.

⁴⁴The aggregate proportions do not necessarily reflect elasticities at the margin, but this report adopts the usual assumption of equivalence of average and marginal income shares.

The following section does not describe a specific macroeconomic model, nor does it try to specify what values should be chosen for critical parameter values. It does, however, try to delineate how each of the aforementioned channels of influence may in practice be accessed in a typical supply-side general-equilibrium macroeconomic model. Alternatively, it may be thought of as a series of six partial-equilibrium estimates of supply-side estimates which, with some care, might be combined to arrive at an overall estimate.

This is by no means an exhaustive list of ways in which tax policy can affect output. For example, tax policies that help to promote education may increase “human capital,” which would in turn increase the productivity of any given amount of labor. Tax policies intended to increase spending on research and development could increase technological know-how. And tax policies that reduce administrative and compliance costs might also increase economic growth by making more of the economy’s resources available for “productive” uses. Although it is lamentable to exclude those latter effects, incorporation of the six chosen channels of influence would be a substantial improvement over current practices.

B. Channels of Influence

1. Implementing effects of tax proposals on labor supply.

Tax policy can affect labor supply in two ways. *First*, it can change the after-tax wage rate. As the “price” of labor increases, more individuals may be expected to enter (or remain in) the labor force, and individuals already in the labor force may be expected to work longer hours. Economists call that effect of the after-tax wage rate on labor supply the “substitution effect.” Quantitatively, that is often measured with an “elasticity of substitution.” For the substitution effect to kick in, a change in tax law must affect the *marginal* tax rate. Therefore, a reduction in individual income tax rates will induce a substitution effect, but a flat-dollar-amount tax rebate will not.

Second, tax policy can affect labor supply through its effect on after-tax income. The more after-tax income individuals have, the less they need to work. Therefore, an increase in after-tax income reduces the supply of labor. Economists refer to that as the “income effect,” and it is expressed quantitatively in terms of an “income elasticity.” Almost all changes in individual taxes have income effects.

To estimate changes in labor supply from a tax policy, economists must calculate the change (if any) in marginal tax rates and multiply that by a substitution elasticity and the change in after-tax income (or, equivalently, the change in the average tax rate) and multiply that by an income elasticity. Those elasticities are rarely estimated by the economist who constructs macroeconomic models but are instead based on reviews of existing empirical

studies.⁴⁵ Because the income and substitution effects work in opposite directions, the net change may be either positive or negative.

There is general agreement among economists that secondary earners (for example, teenagers and senior citizens) are relatively more responsive to changes in after-tax wages than are primary earners. Accordingly, most macroeconomic models disaggregate labor supply into at least two subcategories to reflect that.

In its analysis of the president’s tax proposals in 2003, the CBO calculated the marginal tax rates on labor and after-tax income under current law and under the proposals. To predict the changes in labor supply, the changes in marginal tax rates were applied to assumed substitution elasticities, and the changes in after-tax income were applied to income elasticities. The chosen elasticities were based on the CBO’s comprehensive review of prior empirical studies. For primary earners, the CBO assumed a substitution elasticity of 0.14 and an income elasticity of -0.07; for secondary earners, it assumed a substitution elasticity of 0.75 and an income elasticity of -0.25. The resulting estimated changes in labor supply were inserted in a production function similar to equation (2) to arrive at an estimated percentage change in real GDP.

Economists have written books and hundreds of articles about what the values of those elasticities are, and a great deal of the public debate about dynamic revenue estimation is centered on the issue of elasticities are. But if macroeconomic feedback effects were incorporated into revenue estimates, practicing revenue estimators would spend little time worrying about elasticities. Those values would be chosen in advance and, for consistency’s sake, would have to be the same for all estimates in which they were employed. In the day-to-day practice of dynamic revenue estimating, the more immediate concern for revenue estimators would be how to measure changes in marginal tax rates and changes in after-tax incomes for each proposal.

For calculating changes in after-tax income, revenue estimators do not need much help because these changes are equal to changes in revenue that staff economists must estimate anyway.

However, calculating changes in marginal tax rates is frequently a more difficult matter. Changes in statutory tax rates, the size of tax brackets, standard deduction, personal exemption amounts, child credits, the earned income credit, and many other provisions with phaseouts that vary by income levels all can affect the rate of tax on each additional dollar of income. To calculate the precise effects of all those types of changes for taxpayers at all income levels, in all types of families, and across many other characteristics is an enormous task. So is the task of averaging those effects into an aggregate figure that can be utilized as input into a macroeconomic model.

Fortunately, revenue estimators have a powerful tool at their disposal to assist them in this exercise. The JCT, Treasury, and the CBO have a highly detailed individual

⁴⁵See, e.g., Congressional Budget Office, *Labor Supply and Taxes*, January 1996.

tax microsimulation model. That model is familiar only to a small cadre of tax economists in and out of government, but it is a remarkable tool that has been under continuous development for decades and is the workhorse of revenue estimating staffs at the JCT and Treasury.

An individual tax microsimulation model takes a stratified random sample of more than 100,000 tax returns representing almost every type of taxpayer at every type of income level, scales up that large sample to reach aggregate totals consistent with data for the total economy, and then projects those data forward for 10 years. Then, for every taxpayer in the sample and in every year, the model calculates tax liability under current law and under the proposal being considered. The difference between those two calculations is the static revenue estimate.⁴⁶

To calculate a change in the marginal tax rates used to calculate changes in labor supply, it is necessary to calculate marginal tax rates both under current law and under the proposal in question. To calculate a marginal tax rate (either under current law or under a proposal), the model must be run twice: first under baseline assumptions about income and then by adding some small additional amount (for example, \$100 or 0.1 percent of income) to each taxpayer's income. The resulting change in tax liability divided by the change in income is the marginal effective tax rate.

In a 2002 study, Treasury economists used that method and the Treasury individual tax microsimulation model to calculate the change in marginal tax rates resulting from passage of the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA). In turn Gale and Potter applied those Treasury estimates of changes in marginal tax rates to substitution elasticities to arrive at their estimate of tax-induced changes in labor supply.

Although academics may have the luxury of overlooking that issue, the practical importance of the process by which economists translate policy proposals into economic language is not lost on the JCT staff. In 2002 testimony before the House Ways and Means Committee, JCT Chief of Staff Lindy Paull pointed out:

[T]he model must be capable of utilizing input from the Joint Committee microsimulation tax models to provide the necessary detail to simulate the tax policy proposals within the macroeconomic models. . . . [T]he Joint Committee staff has devoted much effort to creating analytical links between Joint Committee microsimulation tax models and the Joint Committee macroeconomic model.⁴⁷

⁴⁶In its analysis of the House version of the Jobs and Growth Tax Relief and Reconciliation Act of 2003 (JGTRRA), the JCT provides the estimates of changes in marginal tax rates used as inputs into macroeconomic models. See JCT, "Macroeconomic Analysis of H.R. 2, the 'Jobs and Growth Tax Act of 2003.'"

⁴⁷Joint Committee on Taxation, "Written Testimony of the Staff of the Joint Committee on Taxation at a Hearing of the Subcommittee on Oversight of the House Committee on Ways and Means Concerning Modeling the Economic Effects of Changes in Tax Policy," May 6, 2002.

If economists are lucky, a change in tax law may be easy to translate into an economic model. For example, if there is a proposal to reduce income tax rates across the board by 10 percent, all of the macroeconomic model's individual income tax rates are simply reduced by 10 percent.

More often, however, the characteristics of proposals do not correspond to the characteristics of models. Often, those mismatches relate to the degree of aggregation. In the simplest case, there may be a tax rate change that affects a group of taxpayers, but the model is not disaggregated sufficiently to model that group separately. In that case, either the macro model must be disaggregated to accept finer input, or the macro model can be left unchanged and, instead, targeted tax rate reduction is characterized as a smaller tax percentage change affecting a larger population.

The JCT has been working on just that kind of problem. Almost all revenue estimates of major changes in the individual income tax can be modeled using the JCT microsimulation tax model. The JCT acknowledged that in its 2002 testimony:

The Joint Committee staff is in the process of expanding the number of labor supply and investment income equations in the [JCT macroeconomic] model in order to improve linkages between this model and the detailed microsimulation models used by the Joint Committee staff.⁴⁸

2. Implementing effects of tax proposals on capital formation.

a. Personal saving. Economists routinely model increases in personal saving as a function of the after-tax return to saving. Although it is common for lawmakers simply to assume that reductions in tax rates will increase saving, economists are uncertain. In theory a lower tax rate can reduce or increase saving. On one hand, an increase in the after-tax return means that saving for future consumption is "cheaper." That effect will increase saving. On the other hand, with a higher after-tax return, it will require less effort to reach savings objectives (for example, funds for college or retirement).

In empirical work, the responsiveness of savings is commonly measured by an elasticity of savings; that is, the percentage change in savings for a given percentage change in the after-tax return on saving. In general, empirical estimates of saving elasticity are not large. Some have small negative values, some have small positive values, and some are not distinguishable from zero. The elasticity of 0.4 estimated by Michael Boskin⁴⁹ is generally considered to be an upper-bound estimate. When push comes to shove, economists building macroeconomic models often seem comfortable using a value of 0.2, as was the case in studies by Joel L. Prakken,⁵⁰ Jane

⁴⁸*Id.*

⁴⁹Michael J. Boskin, "Taxation, Savings, and the Rate of Interest," 86(2) *Journal of Political Economy*, 2-27 (April 1978).

⁵⁰Joel L. Prakken, "Simulations of a Flat Tax With the Washington University Macro Model," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, pp. 164-183.

COMMENTARY / REVENUE ESTIMATING PROCESS

G. Gravelle,⁵¹ Data Resources Inc. (1997),⁵² and Gale and Potter.⁵³ John G. Wilkens used a value of 0.4,⁵⁴ and Gary and Aldona Robbins⁵⁵ chose an implausibly high value of 1.⁵⁶

Changes in marginal tax rates (as calculated above in the section on labor supply) also affect saving, and those effects can be estimated by multiplying the percentage in the after-tax rate of return by the savings elasticity.

Changes in the availability of tax-advantaged savings accounts can present some special difficulties for estimators. The simplest approach is that chosen by Gale and Potter, who take advantage of the tremendous amount of information implicit in a static revenue estimate. Gale and Potter backward-engineer the revenue estimate to derive an estimate of total utilization of education and retirement savings account provisions in EGTRRA.⁵⁷ All that is necessary now is to estimate what portion of total implied contributions represents new savings. Noting the results of many studies that provide estimates of the percentage of 401(k) contributions that represent new saving, Gale and Potter assume that 50 percent of those contributions represent new saving.

The CBO uses a more difficult but perhaps more conventional approach, using elasticities and measures of changes in marginal tax rates.⁵⁸ The most difficult part of that estimation approach is determining what fraction of all savers would be eligible for the new provisions and what fraction of those savers would undertake new saving as a result of the provision.

b. Government saving. The government saves when its receipts exceed expenditures. Conversely, government

deficits generate negative saving.⁵⁹ Because they decrease the supply of funds available to finance capital formation, government deficits are widely believed to have negative effects on long-term economic growth.

In demand-side Keynesian economics, the opposite is true: Government deficits are expansionary — although whatever salutary effects deficits might provide are likely to be short-lived. Taking advantage of the resilience of Keynesian ideas in the general public, President Bush and his supporters justified deficit-financed tax cuts in 2001, 2002, and 2003 as stimulus necessary to fight recessions.⁶⁰ And it is not just Republican speechmaking that is Keynesian. So is the economic modeling in economic studies that tax-cut proponents like to cite. Two widely cited studies by supporters of the president's plan rely almost exclusively on demand-side effects to show the benefits of the president's plan.⁶¹

In contrast, despite the widespread popular and professional⁶² discontent with large government deficits,

⁵⁹Under current budget rules, the official measure of the budget deficit (the "on-budget" deficit) does not include the large surplus generated by the Social Security Trust Fund. Although the on-budget deficit is probably a better measure of fiscal soundness, the "total" deficit (the deficit including the balance of the Social Security Trust Fund) is a better measure of government saving.

⁶⁰Before his election in 2000, President Bush used Keynesian arguments to justify his proposed tax cuts. He continued to make these arguments after he became president. The following quote from a 2000 speech is typical: "In order to make sure the economy expands, we've got to have good economic policy out of Washington, D.C. I know there's a difference of opinion on about what's good economic policy. But mine starts with saying this — and when the economy slows down, one of the best things we can do is let people keep their own money so they can spend it. If the economy slows down, one of the best answers is tax relief." See "President Focused on Restoring Confidence in Our Economy," Jan. 14, 2002, at <http://www.georgewbush.com/Economy>.

⁶¹The first is by the president's own Council of Economic Advisers (CEA) (Feb. 4, 2003, at <http://www.whitehouse.gov>). The CEA predicts that from 2003 through 2007, GDP growth would be 0.2 percentage points higher on average per year as a result of the president's proposal. That stronger GDP growth would, according to the CEA, lead to 510,000 additional jobs in 2003 and 891,000 new jobs in 2004. A second widely cited study was conducted for the Business Roundtable (<http://www.brt.org>) by PricewaterhouseCoopers using a macroeconomic model of a nonprofit group called Inforum, run by some professors in the economics department at the University of Maryland. That study is more optimistic than the White House's. It predicts that the president's tax cut would increase the number of jobs in the economy by an average of 1.8 million in each of the next two years and by an average of 1.2 million over the next five years. In those models, there are few or no supply-side effects. They rely instead on standard Keynesian principles to generate their upbeat predictions: Increased consumer spending and a larger federal deficit stimulate the economy. See Martin A. Sullivan, "The Great Macroeconomic Flip-Flop," *Tax Notes*, Mar. 17, 2003, p. 1632.

⁶²See, e.g., Martin Feldstein, "The Budget Deficit and National Saving," prepared testimony before the Committee on the Budget, U.S. House of Representatives, January 25, 1989: "I recalled that I have been testifying about the budget deficit to

(Footnote continued on next page.)

⁵¹Gravelle also uses 0.4 to capture redistribution effects. See Jane G. Gravelle, "Simulation of Economic Effects of Flat Rate Income and Consumption Tax Proposals," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, pp. 243-269.

⁵²Data Resources Inc., "Modeling the Macroeconomic Consequences of Tax Policy," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*.

⁵³Gale and Potter ("An Economic Evaluation of the Economic Growth and Tax Relief Reconciliation Act of 2001") chose 0.2 because it is the average of 0.4 estimated by Michael Boskin ("Taxation, Savings, and the Rate of Interest") and 0.0 estimated by E. Philip Howrey and Saul H. Hymans ("The Measurement and Determination of Loanable-Funds Saving," *Brookings Papers on Economic Activity*, 1978, p. 655).

⁵⁴John G. Wilkens, "Dynamic Revenue Estimating: Can It Work? Simulations of the Effects of Three Alternative Tax Systems," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, pp. 270-284.

⁵⁵Gary Robbins and Aldona Robbins, "Tax Reform Simulations Using the Fiscal Associates General Equilibrium Model," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, pp. 184-211.

⁵⁶*Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, Table 6, p. 38, summarizes the assumptions about elasticities that were used by participants in the JCT symposium.

⁵⁷Given a fully phased-in revenue cost of \$66 billion, and assuming an average 25 percent average tax rate, they assume that contributions to these deductible accounts are \$264 billion.

⁵⁸CBO, *How the CBO Analyzed the Macroeconomic Effects of the President's Budget*, July 2003, pp. 20-23.

there has been surprisingly little effort to estimate the detrimental long-term effect of larger deficits on economic growth.⁶³ Fortunately, that appears to have changed in recent years. In 2002 several academic studies explicitly modeled the supply-side effects of larger deficits.⁶⁴ And in 2003, both the JCT⁶⁵ and the CBO⁶⁶ produced dynamic estimates of versions⁶⁷ of what would eventually become JGTRRA of 2003.⁶⁸ Both studies concluded that the negative effects of larger deficits were of a larger magnitude than the positive effects on labor supply and capital formation. In both studies, therefore, the net effect of the tax cut on growth was negative.

c. Business investment. In any economy, total saving (source of funds) and total investment (uses of funds) are two sides of the same coin; and in a closed economy,

the members of this committee since 1983. I warned then and on each subsequent occasion that large budget deficits are eroding our nation's capital stock and thereby slowing the growth of our standard of living." Feldstein is generally associated with conservative economic policies, but liberal-leaning economists also share his view on deficits. For example, in 2002, Peter R. Orszag of the Brookings Institution told the Senate Finance Committee: "The Administration's tax proposals are not well-designed for boosting growth in either the short run or the long run, since they would have only modest effects on demand in 2003 and would expand budget deficits in the long run. All else being equal, the expanded budget deficits would reduce national saving in the long run, exactly the opposite of what would be needed to boost growth." See Peter R. Orszag, "Testimony on Proposals for Economic Growth and Job Creation," Feb. 11, 2003.

⁶³One exception was the effect of deficit on the economy as estimated in the 1994 *Economic Report of the President*, authored by President Clinton's Council of Economic Advisers. See, in particular, pp. 82-87. The CEA, noting that the 1993 Omnibus Reconciliation Act would reduce the deficit by 1.75 percent of gross domestic product, estimated that, as a result, investment spending would increase by approximately 1 percent of GDP. That increase in investment would increase the capital stock as productive capital substitutes for public debt in investors' portfolios. The CEA estimated that, in the long run, that increase in the capital stock would increase real wages and labor productivity by 3.75 percent. The effects of deficits on economic growth were *not* explored in the 1997 JCT symposium on dynamic estimating because the economists were asked to explore the effect of replacing the current U.S. income tax with a *revenue-neutral* broad-based consumption tax.

⁶⁴See Alan J. Auerbach, "The Bush Tax Cut and National Saving," prepared for National Tax Association Spring Symposium, May 2002; CBO, *The Budget and Economic Outlook: An Update*, August 2001; Douglas W. Elmendorf and David L. Reifschneider, "Short-Run Effects of Fiscal Policy with Forward-Looking Financial Markets," prepared for the National Tax Association Spring Symposium, May 2002; and Gale and Potter, "An Economic Evaluation of the Economic Growth and Tax Relief and Reconciliation Act of 2001."

⁶⁵Joint Committee on Taxation, "Macroeconomic Analysis of H.R. 2, the 'Jobs and Growth Tax Act of 2003.'"

⁶⁶CBO, *Analysis of the President's Budgetary Proposals for Fiscal Year 2004*, March 2003, pp. 20-23.

⁶⁷The CBO modeled the president's budget proposal, and the JCT modeled the effect of the House version (H.R. 2) of the legislation.

⁶⁸P.L. 109-27, signed by the president on May 28, 2003.

domestic saving equals domestic investment. It should not be surprising, then, that the effects of changes in business taxation can be modeled as changes in the net after-tax return to saving. That could be accomplished, for example, by incorporating corporate taxes as well as individual taxes into the net after-tax return included in the supply of saving.

By custom, however, economists generally study the effects of business taxation on capital through its effect on business purchases of new equipment and structures. The neoclassical theory of investment behavior first developed by Dale Jorgenson⁶⁹ is the framework that economists use most often to investigate the effects of taxes on capital formation. In Jorgenson's framework, businesses are always trying to adjust their capital spending to get to their desired capital stock. The desired capital stock, like any other commodity, is a function of price. Jorgenson developed a formula that allowed economists to construct an after-tax rental price (or "user cost") of capital from observable variables. Because businesses need a considerable period to move from recognition of their capital needs to actually placing that capital in service, investment spending reacts to changes in the user cost of capital with a lag.

Therefore, to determine changes in business investment, economists must estimate the elasticity of investment with respect to changes in the user cost of capital as well as the length and pattern of the lagged effects. A simple version of the formula for the user cost of capital is:

$$c = (r+d)(1-k-uz)/(1-u) \quad (3)$$

where r is the required after-tax rate of return, d is the rate of economic depreciation, k is the rate of investment tax credit, u is the corporate tax rate, and z is the present discounted value of future depreciation allowances.

In the four decades since the neoclassical theory was first formulated, economists have used it primarily to examine the effects of changes in the corporate tax rate, investment credits, and tax depreciation allowances. Changes in the first two can be inserted directly into the formula by adjusting the terms u and k . Economists can capture changes in depreciation allowances by adjusting z .⁷⁰ That requires a side calculation, but it is a straightforward exercise and a relatively easy one for the estimating staffs at the JCT and Treasury that possess detailed depreciation models.

To estimate a change in investment from policy changes affecting any of those components, the change in the user cost of capital is multiplied by an elasticity of investment with respect to the user cost. Investment flows then increase the stock of capital, which in turn increases aggregate economic activity by increasing its

⁶⁹Dale W. Jorgenson, "Capital Theory and Investment Behavior," 53(2) *American Economic Review*, 247-259 (May 1963).

⁷⁰In its analysis of the House version of JGTRRA, the JCT modeled the effects of more generous depreciation in this manner; i.e., calculated increases in the net present value of depreciation allowances reduced the user costs of capital. See Joint Committee on Taxation, "Macroeconomic Analysis of H.R. 2, the 'Jobs and Growth Tax Act of 2003,'" *Congressional Record*, May 8, 2003.

COMMENTARY / REVENUE ESTIMATING PROCESS

overall productive capacity. Of course, it will not be easy to settle on a single value for this elasticity because, once again, empirical studies by economists yield a wide range of results. A recent paper by Robert S. Chirinko, Steven M. Fazzari, and Andrew P. Meyer provides a review of empirical estimates as well as some original estimates.⁷¹

There are also many other changes in corporate and business taxes that do not involve investment credits or depreciation. Because they do lower taxes on the income from investment capital, they can also be expected to increase incentives for business investment. Unlike most proposed investment credits and changes in depreciation allowances, however, they provide tax relief to old as well as future investment and therefore will have a smaller effect per dollar of revenue loss (have a smaller "bang-for-the buck").

As the JCT explains in its report on the macroeconomic effects of the House version of JGTRRA,⁷² it has its own corporate tax microsimulation model (similar in structure to the individual tax model) that it uses to model effects of proposals affecting business tax liability. That model is based on a sample of approximately 140,000 corporate tax returns.

One way to model these miscellaneous business tax cuts is to compute the equivalent rate of investment credit. For example, suppose it is determined that a 15 percent investment credit would reduce the effective marginal rate of tax on corporate investment to zero, and suppose also that a proposed tax cut reduces corporate taxes by 1 percent. The proposed tax change may be modeled as a 0.15 percentage point increase in the rate of investment tax credit.

d. General equilibrium offsets. Changes in private saving, public saving, and business investment are flows of capital that all have the potential to change the size of the overall capital stock. Whether or not the estimated changes in those flows translate into a larger capital stock and a more productive economy depends on how the economy reacts to those changes.

i. Offsets to deficits. Economists expect that increases in government debt are potentially offset by two phenomena.

First, private saving can be expected to rise in the face of larger government deficits. Some economists have theorized that individuals "see through" the public debt and realize it to be their own; therefore, they increase their own saving dollar-for-dollar when the government decreases its saving.⁷³ That is known as Ricardian equivalence. For Ricardian equivalence to hold, many improb-

able assumptions must hold,⁷⁴ and few economists believe that the proposition provides a description of reality. Nevertheless, economists do believe that changes in government debt are partially offset by changes in private saving.

Second, increases in government debt will be partially offset by net capital inflows from foreign investors. Although massive amounts of investment funds cross international borders daily, there is considerable evidence that capital is not completely mobile; that is, the world is not one completely integrated capital market. Therefore, increased demand for funds by the federal government will be partially satisfied by additional investment by foreigners, but the remainder must be accounted for by changes in the domestic economy.

As emphasized by Boskin, the degree of openness in the U.S. economy is a source of considerable uncertainty.⁷⁵ It is, however, widely agreed that in reality, the U.S. economy has some intermediate degree of openness; that is, that international capital flows partially offset changes in domestic saving and investment. The CBO estimates that changes in domestic saving are offset 40 percent by changes in net foreign investment.⁷⁶ Gale and Potter, citing economics studies that find over the long term that between 25 percent and 40 percent of changes in national saving are offset by net international capital flows, assume that one-third of changes in national saving are offset by changes in net capital inflows.⁷⁷

In the CBO's recent study on the economic effects of the president's budget proposal, the reductions in national saving from increases in the budget deficit are offset partially by changes in private saving and by net capital inflows. Each of those offsets was determined by "rules of thumb based on historical averages and the behavior of a variety of economic models." The private-saving offset used was 40 percent of the initial change in the federal surplus, and the net-foreign-investment offset was 40 percent of the change in national saving (equal to the deficit less the initial 40 percent offset). Therefore, the CBO estimated that each dollar of deficit reduced funds available for investment by 36 cents.⁷⁸

Based on their own review of the empirical evidence, Gale and Potter also assume that net foreign investment

⁷⁴These assumptions include the following: All individuals have no difficulties borrowing; all individuals are aware of changes in government deficits; and all individuals are completely altruistic across generations (in other words, they are concerned about the welfare of their descendants just as much as they would provide for themselves if they lived forever).

⁷⁵Michael J. Boskin, "Summary Discussion," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, pp. 294-298.

⁷⁶The CBO arrived at this figure based on "simple rules of thumb based on historical averages and the behavior of a variety of economic models." See Congressional Budget Office, *How the CBO Analyzed the Macroeconomic Effects of the President's Budget*, p. 27.

⁷⁷Gale and Potter, "An Economic Evaluation of the Economic Growth and Tax Relief Reconciliation Act of 2001."

⁷⁸See Congressional Budget Office, *How the CBO Analyzed the Macroeconomic Effects of the President's Budget*, pp. 26-28.

⁷¹Robert S. Chirinko, Steven M. Fazzari, and Andrew P. Meyer, "That Elusive Elasticity: A Long-Panel Approach to Estimating the Price Sensitivity of Business Capital," 10th International Conference on Panel Data, Berlin, International Conferences on Panel Data, July 5-6, 2002.

⁷²Joint Committee on Taxation, "Macroeconomic Analysis of H.R. 2, the 'Jobs and Growth Tax Act of 2003.'"

⁷³Robert J. Barro, "Are Government Bonds Net Wealth?" *Journal of Political Economy*, October 1979.

will increase by 40 cents for each additional dollar of the federal deficit. To capture the offsetting effects by private saving, they engage in a two-stage estimate. First, based on a review of economic studies, they estimate the increase in interest rates that follows from an increase in the deficit, and then they plug that increase in the rate of return into their private savings function.⁷⁹

ii. Offsets to private saving. The CBO did not find that the president's 2003 tax proposals had any significant effects on private saving, so the issue of offsets to changes in private saving was not addressed in its report. In the Gale and Potter study of the 2001 tax changes, all tax-induced increases in private saving were offset by a 0.4 net-capital-flow offset. In a more detailed macroeconomic model, the same effect might be captured by the following causal chain: Increased private domestic saving reduces domestic interest rates, which in turn reduces international investment inflows.

iii. Offsets to increases in business investment. In a closed economy, unless government policy can somehow induce an increase in private saving, all tax-induced increases in business investment must be offset by reductions in investment not benefiting from tax changes. For example, any estimated increase in corporate investment induced by a reduction in the corporate tax rate will be met by a corresponding reduction in noncorporate investment (including investment in owner-occupied residential housing). Similarly, absent new funds from either domestic or foreign savers, a tax incentive available to all business (corporate and noncorporate) investment (for example, an investment tax credit) will be totally offset by a reduction in residential investment.

In an open economy, any tax-induced increase in a particular class of investment will be offset by a reduction in other investment and by an inflow of foreign investment. One way to model that would be to assume that each dollar of the former investment was offset by some fixed fraction of foreign investment inflows (for example, 0.4) and the remainder by a uniform reduction in all other categories of investment. (As discussed below, those types of changes in the composition of investment could have effects on economic growth because they affect the efficiency of the capital stock.)

The numerical adjustments used by the CBO and by Gale and Potter are side calculations that are not built into an underlying model. If macroeconomic models were sufficiently detailed, they would be automatically calculated. Whether on-model or off-model, however, these general equilibrium adjustments (required to ensure that saving equals investment) have little or no effect on the workload of revenue estimators. If off-model, the private saving and international capital flow offset factors would be determined in advance and would simply be applied to the partial equilibrium results described above pertaining to government saving, business investment, and offsets. If "hard-wired" into the model, there would be no additional work at all.

⁷⁹Gale and Potter, "An Economic Evaluation of the Economic Growth and Tax Relief Reconciliation Act of 2001."

3. Implementing effects of tax proposals on the allocation of capital.

a. Reallocation of investment between residential and nonresidential investment. Because owner-occupied housing is subject to an effective rate of income tax that is close to zero, there is overinvestment in the housing sector. That creates a differential between the productivity of housing and nonhousing investment: Housing generates a lower-than-optimal rate of return while nonhousing investment has an above-average rate of return. Therefore, any policies that can induce a reallocation of capital out of the housing sector will increase the productivity of capital, and the economy can expand without any increase in the size of the capital stock.

Gravelle reports that overinvestment in owner-occupied housing imposes a cost on the economy of between 0.1 percent and 1.0 percent of GDP.⁸⁰ If there were no tax differential between housing and nonhousing investment, that negative impact on the economy could be eliminated.

The effect of tax policies on that inefficiency could be modeled by measuring the change in the tax wedge (the difference in effective tax rates) between business capital and owner-occupied housing. If policies were put in place to reduce that tax wedge, the efficiency of the economy's capital stock would increase. Not all decreases in that tax wedge, however, would result in uniformly proportionate increases in real GDP. In general, the percentage reduction in a difference in tax rate results in a larger percentage reduction in inefficiency.

Under some assumptions,⁸¹ inefficiency is proportional to the *square* of differences in tax rates. Suppose, for example, that the tax on business capital is 30 percent and the tax on owner-occupied housing is 0 percent. Suppose also that there is a reduction in the business rate to 28.5 percent (a 5 percent decline). The resulting reduction in inefficiency would be 17 percent of total estimated inefficiency due to the tax wedge between residential and nonresidential investment.⁸² If the dynamic estimators assumed that the misallocation of residential investment reduced GDP by 0.5 percent, that reduction in the differential would reduce GDP by 0.085 percent.⁸³

b. Reallocation of investment between corporate and noncorporate investment. There is yet another channel of influence that has received a lot of attention from economists. Because corporate investment is subject to an additional layer of tax, there is overinvestment in the noncorporate sector. That creates a productivity differential between corporate and noncorporate investment. Reductions in the taxation of corporate investment can

⁸⁰Jane G. Gravelle, *The Economic Effects of Taxing Capital Income* (Cambridge, Mass.: MIT Press, 1994).

⁸¹Supply and demand curves must be linear.

⁸²The percentage reduction in inefficiency, p , can be calculated with the formula:

$$p = \frac{\int_t x^2 dx}{\int_0 x^2 dx}$$

where $T = 0.300$ and $t = 0.285$.

⁸³0.17 times 0.5.

improve the allocation of capital in the economy by shifting capital to the corporate sector from the noncorporate sector.

As usual, there is a considerable disparity in the empirical estimates of the potential improvement to the economy from eliminating the misallocation of capital between the corporate and noncorporate sectors.⁸⁴ One study estimates that the improvement could be as large as 2 percent of GDP⁸⁵ but most studies report estimates with ranges below 1 percent of GDP. In 1992 Treasury estimated that the benefit of eliminating the distorted allocation of capital between the corporate and noncorporate sectors (by replacing the corporation tax with a lump sum tax) would be between 0.19 percent and 0.39 percent of GDP.⁸⁶ Estimates of this order of magnitude were used by the CBO to estimate the efficiency effect of the president's proposal to eliminate the double taxation of corporate income distributed as dividends.⁸⁷

Paralleling the discussion above (on the allocation of residential versus nonresidential investment), the efficiency gains from reallocating capital from the noncorporate sector to the corporate sector could occur in the following manner:

First, based on a review of the literature, an assumption is made about the efficiency cost stemming from the misallocation of investment between the corporate and noncorporate sectors.

Second, the total tax wedge between the two sectors must be calculated.

Third, the change in the tax wedge between the two sectors is estimated.

Finally, the reduction in inefficiency is calculated (taking into account that efficiency effects are proportionate to the square of differences in tax rates).⁸⁸

⁸⁴All of the empirical studies cited in this paragraph were done before the recent reduction in dividend tax rates. All of those estimates would have to be adjusted to take that into account if they were used in future dynamic revenue estimates (unless they are conducted for years after 2008 and the favorable treatment of dividends is allowed to expire as scheduled under current law).

⁸⁵Jane G. Gravelle and Laurence Kotlikoff, "Corporate Tax Incidence and Inefficiency When Corporate and Noncorporate Goods Are Close Substitutes," 97 *Economic Inquiry*, 501-516 (1993).

⁸⁶U.S. Department of the Treasury, *Report of the Department of Treasury on Integration of the Individual and Corporate Tax Systems*, January 1992, p. 140.

⁸⁷Congressional Budget Office, *How the CBO Analyzed the Macroeconomic Effects of the President's Budget*, pp. 17-20.

⁸⁸Because many estimates of economic costs due to the misallocation of capital from the corporate to noncorporate sectors include the costs arising from the inefficient allocation of capital between business and housing, any analysis using empirical estimates must take care to be consistent to prevent double counting.

IV. Getting the Job Done

A. Multipliers or Models?

To determine the macroeconomic effects of tax policy, economists favor the use of general equilibrium models. In those models, the number of endogenous variables (variables like GDP and labor, determined within the model) equals the number of equations that describe the economy. The model is then calibrated with various values (set in advance at levels chosen to mimic the real world). Included among those exogenous variables are the critical behavioral elasticities.

For each set of exogenous values, the model can be solved using a solution algorithm that finds the set of values for the endogenous variables that puts all of the equations in balance.⁸⁹ To determine the effect of a tax policy change, an exogenous tax variable (like a tax rate or rate of investment credit) is changed in the model and a new model solution is generated. The difference in values of the endogenous variables under the baseline solution and the policy solution is the effect of the policy.

As an alternative to a computational solution, economists can take the same set of equations (including calibrated values and elasticities) and use calculus to differentiate the entire system. Then algebra can be used to calculate "multipliers." A multiplier is a mathematical expression of how any given exogenous variable (for example, a tax rate) affects any chosen endogenous variable (for example, GDP).

When macroeconomic models are large and there are many pathways of interaction among variables, algebraic derivation of multipliers can be intractable. Nevertheless, the use of multipliers based on relatively simple models is extremely useful for economists in general and could be useful to revenue estimators in particular. If an economist can use the multiplier approach, computing a new model solution (running the model) is not necessary. Computing macroeconomic effects is simply a matter of applying the multiplier to the change in the policy variable.

Whether the model or multiplier approach is adopted, the basic macroeconomic structure would be determined in advance. That aspect of dynamic revenue estimation would not add to the day-to-day workload of staff economists.

B. Choosing Elasticities

The results of macroeconomic models depend critically on the value chosen for behavioral elasticities. The larger the substitution elasticity of labor, the lower the income elasticity of labor, the larger the savings elasticity, and the larger the elasticity of investment with respect to the user cost of capital, the more beneficial tax cuts will be to economic growth.⁹⁰ Because there is so much riding

⁸⁹One common solution algorithm, known as Newton's method, is conceptually no different from that burned onto the computer chips of pocket calculators.

⁹⁰For an excellent review, see William C. Randolph and Diane Lim Rogers, "The Implications for Tax Policy of Uncertainty About Labor Supply and Savings Responses," *National Tax Journal*, September 1995.

on the values chosen for those elasticities, there is concern that the choices made by staff economists could be subject to political influence.

Revenue estimators should always exercise vigilance against undue political influence. Nevertheless, there is no reason to believe that it would be an insurmountable problem for the JCT to select values for elasticities that would be broadly acceptable to most economists (and to Wall Street analysts who may fear that dynamic revenue estimation is a gimmick that ultimately will further swell federal deficits).

Government economists routinely exercise judgment in the face of uncertainty, and the choices they make often have serious political and policy implications. JCT economists do that not only in their normal (static) revenue estimates, but also in the production of distribution tables. And at least twice a year, CBO economists predict the future of the economy 10 years forward and thereby set and reset the stage for annual budget debates. The assumptions underlying those estimates are often controversial, but few argue that those analyses should be discontinued,⁹¹ and many would argue that the debate itself is healthy.

Furthermore, it should be noted that if significant uncertainty about estimates precluded their development, the JCT would have to cease production of large numbers of revenue estimates. Why should dynamic revenue estimates as a class be precluded from use if other static estimates of equal or greater uncertainty are also used?

The obvious starting point in the process of deciding critical elasticity values is a careful review of the existing empirical evidence. The key word here is "careful." The temptation simply to take some sort of average of values appearing in the economics literature — a temptation to which noneconomists seem particularly susceptible — should be avoided. Not all studies are equal. Some studies, based on similar methods and data, are redundant. Some have shortcomings, often cited by the authors themselves, that bias the results. Some estimates are not strictly comparable. And some may not be appropriate for use in the macroeconomic model used for dynamic estimation. Most of all, the simple-averaging method of choosing parameter values creates a market for result-driven, politically motivated studies that are conducted solely for the purpose of diluting the attention given to higher-quality research.

The temptation to conduct a simple polling of experts should likewise be avoided. The respondents in that type of polling understand how the results are going to be used, and some may try to influence the results for political reasons or to strategically offset expected overstatements by other respondents.

⁹¹A notable exception is Yale Law School Prof. Michael J. Graetz, who has served as deputy assistant secretary for tax policy. He has repeatedly argued that the JCT and Treasury should not produce distribution tables. See Michael J. Graetz, "Paint-by-Numbers Tax Lawmaking," 95(3) *Columbia Law Review*, 609-682 (April 1995).

That of course does not mean that expert opinion should not be sought. Outside economists not only can provide information about which staff economists are unaware, but also can lend prestige to and promote confidence in the process of dynamic estimating. But outside opinions should be accompanied by clear reasoning and explicit justification so that they can be properly evaluated.

Chosen elasticity values can and should be reviewed on a regular basis, and the value resulting from that process should be used in all estimates. Currently, the CBO convenes a prestigious group of advisers at the beginning of each calendar year to review its 10-year macroeconomic forecast. It would be sensible for the JCT to adopt a similar procedure for a regular review by outside experts of the key assumptions employed in dynamic revenue estimation.

C. The Interface

It has been emphasized throughout this report that the difficult work involved in the development and parameterization of macroeconomic models can and should be done well in advance of any final estimation. Once a macroeconomic model has been built, the dynamic revenue estimating process may be divided into five steps:

1. **Complete** the static estimate;
2. **Translate** policy into model inputs;
3. **Run** the model to calculate change in real GDP;
4. **Use** estimated changes in real GDP to estimate effects on receipts and revenues using the CBO model; and
5. **Add** dynamic effects from step 4 to step 1 to arrive at a dynamic estimate.

Step 1 is no additional burden, because static estimates must be done anyway. Once model inputs are calculated (step 2), the actual generation of model results (step 3) is straightforward. Translating macroeconomic changes into changes in government receipts and expenditures can follow directly from existing CBO models (as discussed more below). And step 5 is merely arithmetic.

Step 2 — the translation of policy into inputs for the macroeconomic model — is the biggest practical problem that dynamic estimators would face. First, estimators must recognize qualitatively all the possible channels of influence that a proposal may present. Second, in each applicable category, the estimator must estimate the change in the exogenous variable (sometimes called the "policy lever") that the proposal affects. Herein lies the real "art" of properly using a macroeconomic model.

If dynamic revenue estimation is not going to impose an unreasonable additional workload on the estimating staff, and if lawmakers are going to receive estimates of critical proposals in the timely manner to which they have become accustomed, bottlenecks must be avoided at the interface between the static estimate and the input side of the macroeconomic model. As much as possible, procedures must be organized and streamlined at that critical juncture.

In the case of static revenue estimates, each estimate is usually the responsibility of a single economist working alone. That specialization is entirely sensible because of

Possible Checklist for Dynamic Revenue Estimating	
Channel of Influence	Necessary Information to Implement Dynamic Estimate
(1) Labor Supply	Estimate the change in marginal tax rates and in after-tax incomes using individual tax microsimulation model
(2) Private Saving	Estimate changes in marginal tax rates using the individual tax microsimulation model. (Offset from net capital inflows may be estimated by macroeconomic model or off model.)
(3) Public Saving	Add interest costs to static revenue estimate. (Offsets from private savings and net capital inflows may be estimated by macroeconomic model or offmodel.)
(4) Business Investment	For changes in depreciation rules, calculate change in present discounted value of depreciation allowances (sometimes known as z) and plug directly into cost-of-capital formula. For changes in investment credit, plug new marginal rate into cost-of-capital formula. For changes in the corporate, plug directly into cost-of-capital formula. For other "miscellaneous" changes, compute an investment credit equivalent and use in cost-of-capital formula. (Offsets from private savings and net capital inflows may be estimated by macroeconomic model or offmodel.)
(5) Reallocation of investment between residential investment and nonresidential investment	Calculate the reduction in tax differential between residential and nonresidential investment.
(6) Reallocation of investment between corporate and noncorporate sectors	Calculate the reduction in tax differential between corporate and noncorporate sectors.

the uniqueness and complexity of the data and issues involved. For example, one staff economist will specialize in estimates of provisions involving life insurance companies; another will specialize in estimates of tax proposals involving energy credits; and so on. Some former congressional estimators have referred to revenue estimating as a "cottage industry." More than once, tense congressional negotiations have ground to a halt as a single economist labored alone to estimate a new variation of an old proposal.

Dynamic revenue estimation lends itself more to teamwork. Much of the additional work that dynamic estimation entails may be done separately and simultaneously by staff members other than the economist doing the static estimate. One way to speed up the process is to take advantage of a natural division of labor that follows easily from the way economists like to classify themselves.

Specifically, a microeconomist can work on the static estimate, and a macroeconomist can work on the dynamic portion. While it is true that a final dynamic estimate will not be possible until the static estimate is completed, a macroeconomist can review the issues and do practice runs on similar proposals before the static estimate is completed. There is no reason why, once the final static estimate is available, the dynamic element could not be available in short order. With a well-developed interface between the static estimate and the macroeconomic mode, the microeconomist need not understand macroeconomic modeling, and the macroeconomist does not need to understand the inner workings of static estimate.

The previous section provided a simple model of aggregate supply. It suggested six channels of influence by which tax policy may potentially affect aggregate supply. The estimator must first make the qualitative assessment about which channels of influence are relevant. To assist in that assessment, a checklist like the one below could be used.

- Changes in individual income taxes affect channels 1 and 2.
- Changes in business taxes alone affect channels 4 and 5.
- Changes in corporate taxes alone affect channels 4, 5, and 6.
- All tax changes that affect receipts affect channel 3.

Then, for each applicable channel, calculations could be made to provide new inputs for the macroeconomic model (or the multipliers). Given the conventions employed in prior macroeconomic studies, identifying relevant channels should not be a challenging task.

D. Translating Economic Changes

Both receipts and outlays are affected by changes in economic conditions. Government economists at the CBO and — for the executive branch — the Office of Management and Budget are expert at estimating the effects of macroeconomic changes on government receipts and expenditures. They have simulation models, as well as rules of thumb based on model simulations, to estimate those effects. Each year, the OMB publishes those rules of thumb as part of its budget submission.⁹²

Whether models or rules of thumb are employed, it is likely that dynamic revenue estimators will need to do some work to align the output of the macroeconomic model with the inputs needed to estimate changes in receipts and outlays. For example, as noted by both the JCT and the CBO, the output of their macroeconomic models often had insufficient detail and had to be further disaggregated to make it consistent with the output from

⁹²For the OMB's most recent presentation of the sensitivity of the deficit to economic assumptions, see *Budget of the United States Government, FY 2004, Analytical Perspectives*, Table 2-6, p. 32.

models used to estimate changes in receipts and outlays.⁹³ It is worth noting that once that interface between models has been completed, it will be the same for all estimates (and therefore can be “hard-wired” into the macroeconomic model). Therefore, this will not appreciably slow down the production of *individual* estimates.

E. Coordinating the Roles of the JCT and CBO

By law and by tradition, JCT economists are responsible for revenue estimates, while CBO economists are responsible for forecasts of economic aggregates, including overall receipts and outlays, as well as estimates of the costs of individual expenditure proposals. The JCT’s work is what the academics put under the heading of microeconomics. At the same time, most of the macroeconomic analysis produced for the legislative branch of government comes from the CBO. Given that dynamic revenue analysis is where the macroeconomics and microeconomics of public finance overlap, it is not surprising that several issues of coordination between the two agencies arise.

There needs to be consistency between the CBO’s baseline receipts estimates and JCT estimates of changes in receipts due to tax proposals.

First, as pointed out by former CBO Director Robert Reischauer during the 1997 JCT symposium on dynamic estimates, there needs to be consistency between the CBO’s baseline receipts estimates and JCT estimates of changes in receipts due to tax proposals. In practice, budget and economic forecasts used by the CBO take into account the general policies that underlie a budget resolution. Unless there is some sort of emergency or surprise legislation, the economic ramifications of proposed tax changes are already incorporated into the CBO forecast. If the JCT is going to begin to include macroeconomic effects in its revenue estimates of proposed policy changes, the CBO will have to remove the effects of policies incorporated into the budget resolution from its “baseline” estimate.

A second issue stems from the fact that changes in real GDP generated by changes in the tax law affect government outlays as well as tax receipts. Any estimate of dynamic budget effects can just as easily include effects on outlays as well as receipts, except for the fact that the JCT has no authority to undertake estimates of changes in outlays.⁹⁴ To report full dynamic effects to Congress, the

JCT will either have to get authority from Congress to undertake those outlay estimates or coordinate closely with the CBO. Given the need for speed in the revenue estimating process, it probably makes more sense to keep all revenue estimating responsibilities the work of one staff and allow the JCT to estimate changes in outlays (due to macroeconomic effects of proposed tax changes) and to include those changes as part of their macroeconomic effects. That, of course, would not preclude extensive interaction and cooperation between the staffs when models and procedures for using them are being developed.

Although it may require some institutionally uncomfortable changes in responsibilities and procedures, the above coordination issues are conceptually straightforward. More difficult is the problem of estimating macroeconomic effects of changes in spending programs and regulatory rules. After all, there is no reason why the estimation of macroeconomic effects should be limited solely to changes in tax law. The problem is that, in general, the effects of government spending policies on economic growth are less well studied than the effects of tax policies.

There is, however, some good news. The important effects of debt-financed increases in government spending can (and should) be modeled in exactly the same manner as described above for debt-financed tax cuts. The effects of increases in Social Security, unemployment, and other entitlement programs are likely to have the same detrimental effect on labor supply and therefore could be modeled in the same manner as described above for the effect of a tax cut on after-tax income, and it is probably a fair approximation to treat government expenditure on real capital (for example, roads and building) as having a salutary effect on capital stock that completely offsets the negative effect of the increased debt used to finance the project. But many politically sensitive and economically difficult issues would remain. In what manner, if at all, should the positive economic effects of increased free trade, education, and medical care be modeled to calculate effects on the economy? What about potentially negative economic effects of increased government regulations?

F. The Importance of Disclosure

1. Static estimates. In general, the JCT’s revenue estimating is shrouded in secrecy. The mere existence of a request for a revenue estimate by a member of Congress is considered a confidential matter — on par with the attorney-client relationship. When estimates are completed, responses are provided only to the member who made the request. The member, in turn, may or may not disclose the estimate to interested parties or to the public at large.

Without this authority, the JCT did not pursue this issue as part of its study of dynamic estimating in 1996-1997. As noted in the text, the CBO includes both changes in outlays and changes in receipts as part of its estimate of the macroeconomic feedback effects of the president’s budget proposals for fiscal 2004. See Congressional Budget Office, *How the CBO Analyzed the Macroeconomic Effects of the President’s Budget*.

⁹³See Joint Committee on Taxation, “Macroeconomic Analysis of H.R. 2, the ‘Jobs and Growth Tax Act of 2003,’” and Congressional Budget Office, *How the CBO Analyzed the Macroeconomic Effects of the President’s Budget*.

⁹⁴This issue was acknowledged by the JCT in 1997: “[M]acroeconomic impacts [from changes in tax law] may affect government spending such as entitlement payments, but these are not within the purview of the JCT.” *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, p. 3.

(Footnote continued in next column.)

Beyond the estimate itself, the JCT is reluctant to provide anything more than general details about the method used to arrive at the estimate. There are, however, some notable exceptions. In 1990, for example, due to the controversy surrounding the disparity between the JCT and Treasury revenue estimates of capital gains relief, the JCT published a detailed description of its data sources and calculations.⁹⁵ For most revenue estimates, the JCT does not reveal its method — even to the lawmaker who submitted the request for the estimate. Occasionally, it will discuss details behind revenue estimates provided to congressional staff or lobbyists. The degree of disclosure often is highly dependent on the disposition of the individual estimator and the persistence of those seeking the information.⁹⁶

Various rationales for nondisclosure of revenue estimating methods are provided. For example, the argument is sometimes made that estimates often use confidential taxpayer information that under the law⁹⁷ may not be released to the public. It has also been pointed out that the JCT staff already has an enormous workload and that the additional documentation required for meaningful disclosure to the public would divert limited staff resources from efforts to provide information to the Congress.

But the argument most frequently offered as justification for the policy of nondisclosure is that disclosure could introduce biases into the revenue estimating process. Given the obscurity of most proposals for which revenue estimates are provided, the reality is that only interested parties — such as lobbyists and staff of members who support the legislation — have the time and resources to review the methods. Because revenue estimating is far from an exact science, it is inevitable that many aspects of the estimate are subject to dispute. Advocates are likely to critique assumptions only when revisions are not favorable to their cause. At the same time, they will not challenge questionable assumptions that are favorable to their cause. In that case, revisions resulting from disclosure would be biased in favor of special interests.

There is a lot of validity to that argument. In response, some would argue that it is inconsistent with the time-tested principles of the Freedom of Information Act. To

safeguard privacy, national security, and free deliberation of ideas in the policymaking process, the FOIA provides numerous exceptions to its general requirement for disclosure. Nothing like the prevention-of-selective-bias argument described above is included in the act as a justification for nondisclosure. Also, some would argue that, no matter what the outcome, lack of disclosure by government agencies is unacceptable as a matter of principle.

The argument most frequently offered as justification for the policy of nondisclosure is that disclosure could introduce biases into the revenue estimating process.

Furthermore, it is arguable that the current practice of limited disclosure creates its own biases. As noted above, the JCT already allows some limited review of its estimates on a case-by-case basis. In practice, that means primarily that lobbyists or staff members (at lobbyists' urging) can get to second-guess the estimators. Full disclosure of methods would make it more likely that academics, the press, and public-interest groups might be able to counterbalance existing estimating biases introduced by special interests.

2. Dynamic estimates. Whatever one's opinion may be concerning the proper degree of disclosure of current revenue-estimating methods, there is probably a stronger case to be made for disclosure of details of dynamic estimates.

First, it would probably be impossible to keep important aspects of any macroeconomic model out of the public view. Over time, as many estimates from the same underlying model became available, it would be possible to "reverse engineer" important features of the model. Furthermore, it is likely that any macroeconomic model used for revenue estimating would, at a minimum, be subject to regular review by economic experts that are not on the JCT staff. If their review was to be meaningful, disclosure to them would be detailed. It would be unreasonable to expect those experts to keep details secret.

Second, the introduction of systematic bias seems less likely with dynamic estimates. It is true that broad coalitions are likely to advocate for the use of assumptions in a macroeconomic model that favor their common interest (for example, capital formation); but any excesses are likely to be kept to a minimum by coalitions with opposing interests (deficit reduction), by academics, and by watchdogs in the press. The economic issues surrounding static estimates are often of little academic interest; and it is frequently found that no relevant academic research on the topic is available. In contrast

⁹⁵Joint Committee on Taxation, *Explanation of Methodology Used to Estimate Proposals Affecting the Taxation of Income From Capital Gains*, JCS-12-90, Mar. 27, 1990.

⁹⁶Similarly, the Treasury's Office of Tax Analysis generally does not reveal its revenue-estimating method to the public. In one instance, as a result of a request under the Freedom of Information Act, Treasury was forced to reveal its method. See *American Society of Pension Actuaries v. IRS*, 746 F.Supp. 188 (D.D.C. 1990). The nonprofit publisher Tax Analysts of Arlington, Va., has made a request under the FOIA for release of documents describing the method used for the estimate of the dividend relief provision published in the president's fiscal 2004 budget. See "Tax Analysts Files FOIA Request for Dividend Exclusion Revenue Estimate Records," *Doc 2003-6918*, 2003 TNT 52-12, Mar. 4, 2003. The JCT and the CBO, like all congressional offices, are not subject to FOIA.

⁹⁷Section 6103 of the Internal Revenue Code.

there is usually a large body of research available on issues that are critical for tracking the macroeconomic effects of tax policy.⁹⁸

Finally, disclosure is not an all-or-nothing proposition. Revelation of the general features and important elasticities used in dynamic estimation could be revealed at regular intervals (for example, annually) or whenever significant changes in the model were introduced. The more detail provided in the “general” disclosures, the less need there would be for additional disclosure with each individual estimate.⁹⁹

3. Disclosure as education. One of the purposes of dynamic estimation is to provide information about policy effects beyond effects on the budget. Lack of disclosure would frustrate that purpose.¹⁰⁰ Simply telling members of Congress that their proposals provide positive or negative macroeconomic feedback effects of a certain magnitude has only a limited ability to enhance their understanding.

Using a checklist as a guide, the JCT could routinely inform members through which channels of influence their proposals affect the economy and how much of the total dynamic effect is attributable to each channel. The following is a hypothetical example of the type of paragraph that could be added to each revenue-estimating letter transmitted by the JCT to members of Congress:

⁹⁸Another benefit of disclosure is that it is likely to spur more research both from academic economists and from the grant-making organizations that fund them. More research on issues relevant to dynamic estimation as well as specific critiques of any JCT macroeconomic model are likely to improve accuracy and minimize potential political biases.

⁹⁹This type of general disclosure appears to be what proponents of dynamic revenue estimation and the drafters of new House rules have in mind. In 1998 Rep. Tom Campbell, R-Calif., introduced H.R. 4452 and Sen. John Ashcroft, R-Mo., introduced S. 2357; in 2003, Sen. John E. Ensign, R-Nev., introduced S. 675. In addition to mandating dynamic estimation, these bills would also require the JCT to provide a “written statement fully disclosing the economic, technical, and behavioral assumptions that were made in producing that [dynamic] estimate.” In 2002 the House adopted a rule that required dynamic revenue estimates and specified that these estimates must be accompanied by “a statement from the Joint Committee on Internal Revenue Taxation identifying the critical assumptions and the source of data underlying that estimate.” Regrettably, it appears that the JCT has responded to this requirement only halfheartedly. For example, its report did not reveal what quantitative values of critical behavioral elasticities were used by the staff in its models.

¹⁰⁰All three introduced dynamic revenue-estimating bills cited in the text contain the same language requiring the JCT to disclose its methods: specifically, a “written statement fully disclosing the economic, technical, and behavioral assumptions that were made in producing that [dynamic] estimate.” The House rule adopted in 2002 requiring dynamic estimates of tax bills reported out of the Ways and Means Committee also required disclosure, but used somewhat different language. As noted, according to the rule, JCT dynamic estimates must be accompanied by “a statement from the Joint Committee on Internal Revenue Taxation identifying the critical assumptions and the source of data underlying that estimate.”

As indicated in the table above, your proposal for an investment credit has a static revenue cost of \$10 billion over the 10-year estimation period. Macroeconomic (“dynamic”) feedback effects reduce this revenue cost by \$1 billion. The dynamic effects are attributable to a combination of positive effects of increased capital formation (\$2.0 billion); efficiency gains due to the improved allocation of capital between the housing and business sectors (\$0.5 billion); and negative effects on growth from the reduction in domestic saving attributable to an increase in the federal deficit (negative \$1.5 billion). The JCT determined that the proposal’s effects on labor supply, private saving, and the allocation of capital between the corporate and noncorporate sectors were not significant. There may be other macroeconomic effects, but the JCT at this time has not adopted procedures to incorporate such effects into revenue estimates.

Such an explanation of the effects of the particular proposal, along with a separate detailed description of the general model used and elasticities assumed, would allow members of Congress to understand both how their proposals would affect the economy and how these proposals might be improved.

G. The Number of Estimates

Many commentators argue that dynamic revenue estimating should be undertaken only for proposals of sufficient importance. At the JCT’s 1997 symposium on dynamic revenue estimation, Michael Boskin told participants: “It seems to me the JCT cannot be asked to estimate the macroeconomic effects of the more than 1,000 tax proposals on which they are asked to do revenue estimates. That would be unreasonable.”¹⁰¹ He later added that dynamic analysis is an appropriate objective “for large scale, fundamental changes, not for run-of-the-mill minor amendments. If somebody asks you to do a veterinary deduction estimate, I doubt that would have any macroeconomic impact.”¹⁰²

In its concluding remarks on the 1997 symposium, the JCT wrote:

All participants of the modeling project agreed it would be quite time-consuming to re-configure any of the existing models to analyze variations of a given set of tax proposals. It will be necessary to produce guidelines for determining which tax proposals would be appropriate for such macroeconomic analysis, and how to treat numerous variations on these proposals.¹⁰³

So far, it appears that lawmakers are willing to accept limitations consistent with these ideas. In 1998 identical legislation was introduced in the House of Representatives (H.R. 4452) by Rep. Tom Campbell, R-Calif., and in

¹⁰¹Boskin, “Summary Discussion,” in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, pp. 294-298.

¹⁰²*Id.*

¹⁰³*Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, pp. 47-48.

the Senate (S. 2357) by John Ashcroft, R-Mo., to require the JCT to produce dynamic revenue estimates. This requirement applied only to legislation with static effects above \$100 million in at least one fiscal year. In similar legislation introduced in 2003 (S. 675), Sen. John E. Ensign, R-Nev., increased the annual threshold to \$250 million. Also, it appears that in most states that do dynamic revenue estimating — either by statute or on their own volition — efforts are restricted only to proposals of sufficient size or importance.

From a political standpoint, the broad consensus for restricting dynamic estimation only to proposals above a certain size is understandable. Proponents of dynamic revenue estimating want to get their foot in the door and to mute arguments about the difficulty of dynamic estimating by limiting estimators' workload. Opponents of dynamic estimating will not argue with any sort of limitations on dynamic estimating because restrictions on dynamic estimating are consistent with their broader argument that dynamic estimation is not operable in practice.

If dynamic revenue estimation procedures were adopted by the JCT, however, the exception for "small" proposals could have some negative aspects as well. First of all, it is technically easy to circumvent the provision. If any proposal received an estimate with an unfavorable feedback effect, it could be divided into separate legislation to lose the dynamic effect. Alternatively, when positive dynamic effects are expected, proposals might be artificially packaged together in order to get a boost from a favorable dynamic effect. Worse still, as written, feedback effects could be triggered on and off by artificially shifting revenue in any one year above or below the threshold amount (\$250 million in the Ensign bill).¹⁰⁴

One might argue that such maneuvers by Congress violated the spirit of the rules and would never withstand public scrutiny, but anyone familiar with the history of budget rules in practice knows that, under pressure, Congress is not above resorting to budget gimmicks. Further, there is no court of law to review budget rules and no jail time for offenders. The same people who make the rules — members of the budget committee and their staffs — are the same people who often have the greatest incentive to break the rules; they are also the same people who interpret the rules for the other members of Congress, who — along with the public in general — can barely understand them.

Even if the potential for gaming limitation rules for strategic advantage were not possible, providing dynamic scoring for all proposals — not just large proposals — might still be desirable. As so many commentators, including Hubbard and Crippen, have pointed out, dynamic revenue estimates are intended to serve *two* purposes: to improve the accuracy of revenue estimates and to help educate Congress about the economic attributes of proposed tax changes. At least big tax bills get some scrutiny from a public policy perspective from think

tanks, the press, and academics. A limitation rule that excluded macroeconomic analysis of less significant proposals ironically would deprive Congress economic analysis of proposals that are least likely to be subject to scrutiny except by directly interested parties.

V. Conclusion

By its nature, dynamic revenue estimation is an ambitious undertaking. Faced with the almost innumerable difficulties and uncertainties that accompany it, any economist who asserts its viability can radiate an aura of insufficient humility or, worse, a lack of intelligence. But the age-old question must be asked: What is the alternative? Every year, lawmakers propose hundreds and enact dozens of changes in tax law, usually with only the slightest amount and vaguest kind of economic analysis. Would the results of dynamic revenue estimation be better than "the unsubstantiated assertions that policy makers now use in the debate"?¹⁰⁵

Suppose, for example, that a framework like that described in the prior sections of this paper was employed by the JCT with all of its estimates. Gradually, lawmakers, the press, and the public would be far better acquainted with the following important and powerful economic ideas. In particular, they would learn that:

1. Marginal rate reductions are more economically beneficial than inframarginal tax giveaways.
2. A switch to a consumption tax will improve the economy in the long run but not by exorbitant amounts.
3. Long-term stability and growth are far more reasonable than fine-tuning as objectives for tax policy.
4. Inefficient taxation of residential investment reduces economic growth.
5. Overtaxation of corporate capital hinders economic growth.

And, perhaps most important in light of a federal budget deficit that is likely to exceed a half-trillion dollars in fiscal 2004:

6. Deficits hurt long-term economic growth, and tax cuts financed by deficit are not likely to increase long-term growth.
7. Tax cuts — especially cuts in marginal rates — financed by reductions in government spending are likely to have a substantial positive benefit on growth.

As noted, the supply-side framework in this report does not include all the effects of taxation that economists would like to examine. Depending on one's perspective, the glass could be considered half-full as well as half-empty. From the perspective of this economist, if the only "dynamic" thing the JCT did was to incorporate the

¹⁰⁴The problems with limiting dynamic analysis to classes of proposals are discussed by the CBO in its January 1995 report, *Budget Estimates: Current Practices and Alternative Approaches*.

¹⁰⁵Robert D. Reischauer, "Summary Discussion," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, p. 299.

detrimental effects of federal deficits on capital formation, that would be more than worth the effort.

References

- Auerbach, Alan J., "Government Revenue Estimation: Problems and Potential Solutions," testimony before the Committee on Finance, U.S. Senate, Jan. 24, 1995.
- , "The Bush Tax Cut and National Saving," paper prepared for National Tax Association Spring Symposium, May 2002.
- Auerbach, Alan J., Laurence J. Kotlicoff, Kent Smetters, and Jan Waller, "Fundamental Tax Reform and Macroeconomic Performance," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 83-100.
- Ballard, Charles L., "Discussion," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 153-163.
- Barro, Robert J., "Are Government Bonds Net Wealth?" *Journal of Political Economy*, October 1979.
- , *Getting It Right: Markets and Choices in a Free Society* (Cambridge, Mass.: MIT Press, 1997).
- Berck, Peter, Elise Golan, and Bruce Smith, "Dynamic Revenue Analysis in California: An Overview," *State Tax Notes*, Oct. 28, 1996, p. 1227.
- Blinder, Alan S., and Janet L. Yellen, *The Fabulous Decade: Macroeconomic Lessons From the 1990s*, Twentieth Century Fund, 2001.
- Boskin, Michael J., "Taxation, Saving, and the Rate of Interest," *Journal of Political Economy*, vol. 86, no. 2, part 2 (January 1978), pp. S3-S28.
- , "Summary Discussion," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 294-298.
- Brinner, Roger E., "Modeling the Macroeconomic Consequences of Tax Policy," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 212-242.
- Business Roundtable, "Study Showing Positive GDP and Job Growth Impact of President's Economic Package," January 21, 2003, at <http://www.brt.org/pdf/PWC20030130/PWCMarylandStudy.pdf>. The study was commissioned by the Business Roundtable and was conducted by PricewaterhouseCoopers.
- Chirinko, Robert S., Steven M. Fazzari, and Andrew P. Meyer, "That Elusive Elasticity: A Long-Panel Approach to Estimating the Price Sensitivity of Business Capital," 10th International Conference on Panel Data, Berlin, International Conferences on Panel Data, July 5-6, 2002.
- Clayton-Matthews, Alan, "The Massachusetts Dynamic Analysis Model," *State Tax Notes*, Sept. 20, 1993, p. 639.
- Congressional Budget Office, *Budget Estimates: Current Practices and Alternative Approaches*, January 1995.
- , *CBO's Method for Estimating Potential Output*, CBO Memorandum, October 1995.
- , *Labor Supply and Taxes*, January 1996.
- , *CBO's Method for Estimating Potential Output, An Update*, CBO Memorandum, August 2001.
- , *The Budget and Economic Outlook: An Update*, August 2001.
- , "Testimony of CBO Director Dan L. Crippen Before House Budget Committee Hearing on Role of CBO," May 21, 2002.
- , *Analysis of the President's Budgetary Proposals for Fiscal Year 2004*, March 2003.
- , *How the CBO Analyzed the Macroeconomic Effects of the President's Budget*, July 2003.
- Council of Economic Advisers, "President Bush's 2001 Tax Relief Softens the Recession," February 4, 2003, at http://www.whitehouse.gov/cea/TaxReliefActUpdate_Feb02wp.pdf.
- , *Economic Report of the President*, 1962.
- , *Economic Report of the President*, 1973.
- , *Economic Report of the President*, 1986.
- , *Economic Report of the President*, 1994.
- Data Resources Incorporated, "Modeling the Macroeconomic Consequences of Tax Policy," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997.
- Elmendorf, Douglas W., and David L. Reifschneider, "Short-Run Effects of Fiscal Policy with Forward-Looking Financial Markets," prepared for National Tax Association Spring Symposium, May 2002.
- Engen, Eric, and William Gale, "Macroeconomic Effects of Fundamental Tax Reform: Simulations with a Stochastic Life-Cycle, Overlapping Generations, General Equilibrium Model," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 101-129.
- Feldstein, Martin, "The Budget Deficit and National Saving," prepared testimony before the Committee on the Budget, U.S. House of Representatives, Jan. 25, 1989.
- Gale, William G., and Samara R. Potter, "An Economic Evaluation of the Economic Growth and Tax Relief Reconciliation Act of 2001," *National Tax Journal*, March 2002, pp. 133-186.
- Graetz, Michael J., "Paint-by-Numbers Tax Lawmaking," *Columbia Law Review*, Vol. 95, No. 3 (April 1995), pp. 609-682.
- Gravelle, Jane G., *The Economic Effects of Taxing Capital Income* (Cambridge, Mass.: MIT Press, 1994).
- , "Simulation of Economic Effects of Flat Rate Income and Consumption Tax Proposals," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 243-269.
- Gravelle, Jane G., and Laurence Kotlikoff, "Corporate Tax Incidence and Inefficiency When Corporate and Non-corporate Goods Are Close Substitutes," *Economic Inquiry*, Vol. 97 (1993), pp. 501-516.
- Greenspan, Alan, "Testimony Before the Joint Hearing of the Senate and House Budget Committees on the Budget," Jan. 10, 1995.

- Hepner, Mickey, and W. Robert Reed, "Dynamic Scoring in the Public and Private Sectors: Final Report," study commissioned by the World Council on Economic Policy for the Heritage Foundation, Mar. 21, 2003.
- Howrey, E. Philip, and Saul H. Hymans, "The Measurement and Determination of Loanable-Funds Saving," *Brookings Papers on Economic Activity*, 1978, p. 655.
- Hubbard, R. Glenn, "Testimony of Council of Economic Advisers Chair Before Subcommittee on Oversight of House Ways and Means Committee," President's Council of Economic Advisers, May 7, 2002.
- Joint Committee on Taxation, *Explanation of Methodology Used to Estimate Proposals Affecting the Taxation of Income from Capital Gains*, JCS-12-90, Mar. 27, 1990.
- , *Factors Affecting the International Competitiveness of the United States*, JCS-6-91, May 30, 1991.
- , *Tax Policy and the Macroeconomy: Stabilization, Growth, and Income Distribution*, JCS-18-91, Dec. 12, 1991.
- , "Written Testimony of the Staff of the Joint Committee on Taxation Regarding the Revenue Estimating Process for the Joint Hearing of the House and Senate Budget Committees of the 104th Congress on January 10, 1995," JCX-1-95, Jan. 9, 1995.
- , "Membership of the Joint Committee on Taxation Revenue Estimating Advisory Board," JCX-29-95, June 29, 1995.
- , *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997.
- , "Testimony of the Staff of the Joint Committee on Taxation Before the Committee on Ways and Means," JCX-82-99, Nov. 10, 1999.
- , "Written Testimony of the Staff of the Joint Committee on Taxation at a Hearing of the Subcommittee on Oversight of the House Committee on Ways and Means Concerning Modeling the Economic Effects of Changes in Tax Policy," JCX-36-02, May 6, 2002.
- , "JCT Blue Ribbon Advisory Panel List," *Doc 2002-22897*, 2002 TNT 196-44, Oct. 7, 2002.
- , "Macroeconomic Analysis of H.R. 2, the 'Jobs and Growth Tax Act of 2003,'" *Congressional Record*, May 8, 2003, pp. H3829-H3832.
- Jorgenson, Dale W., "Capital Theory and Investment Behavior," *American Economic Review*, Vol. 53, No. 2 (May 1963), pp. 247-259.
- Jorgenson, Dale W., and Peter J. Wilcoxon, "The Effects of Fundamental Tax Reform and the Feasibility of Dynamic Revenue Estimation," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 130-151.
- Kiefer, Donald W., "Tax Cuts and Rebates for Economic Stimulus: The Historical Record," Congressional Research Service, January 1991.
- Kiefer, Donald, Robert Carroll, Janet Holtzblatt, Allen Lerman, Janet McCubbin, David Richardson, and Jerry Tempalski, "The Economic Growth and Tax Relief Reconciliation Act of 2001: Overview and Assessment of Effects on Taxpayers," *National Tax Journal*, March 2002, pp. 89-118.
- Mankiw, N. Gregory, "A Quick Refresher Course in Macroeconomics," *Journal of Economic Literature*, Vol. 28 (December 1990), pp. 1645-1660.
- , "The Reincarnation of Keynesian Economics," *European Economic Review*, April 1992, pp. 559-565.
- Orszag, Peter R., "Testimony on Economic Growth and Job Creation," Committee on Finance, U.S. Senate, Feb. 11, 2003.
- Peacock, Bill, "Rylander Implements Dynamic Analysis," *The Houston Review*, June 5, 1999.
- Phillips, Frank, and Scot Lehigh, "No Evidence of Gain From '92 Tax Cut," *The Boston Globe*, Mar. 15, 1995.
- Prakken, Joel L., "Simulations of a Flat Tax with the Washington University Macro Model," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 164-183.
- Randolph, William C., and Diane Lim Rogers, "The Implications for Tax Policy of Uncertainty About Labor Supply and Savings Responses," *National Tax Journal*, September 1995.
- Rangel, Charles B., Letter to colleagues, *Doc 2003-12150*, 2003 TNT 94-19, May 12, 2003.
- Reifenschneider, David, "Discussion," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 285-293.
- Reischauer, Robert D., "Summary Discussion," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 299-302.
- Robbins, Gary, and Aldona Robbins, "Tax Reform Simulations Using the Fiscal Associates General Equilibrium Model," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 184-211.
- Rogers, Diane Lim, "Assessing the Effects of Fundamental Tax Reform With the Fullerton-Rogers General Equilibrium Model," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 49-82.
- Rojas, Warren, "Economists Praise 'Constructive' Scoring Exchange," *Tax Notes*, Oct. 14, 2002, p. 191.
- , "Dynamic Scoring Report Coming Soon?" *Tax Notes*, Dec. 16, 2002, p. 1401.
- Rosen, Harvey S., "Summary Discussion," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 303-305.
- Slemrod, Joel, "Summary Discussion," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 306-310.
- Sullivan, Martin A., "Fiscal Stimulus: Are We Fighting the Last War?" *Tax Notes*, Oct. 15, 2001, p. 310.
- , "Hearings on Dynamic Scoring Are Anything but Dynamic," *Tax Notes*, May 13, 2002, p. 955.
- , "The Great Macroeconomic Flip-Flop" *Tax Notes*, Mar. 17, 2003, p. 1632.

—, "Mandated JCT Report Says House Bill May Hurt Economy," *Tax Notes*, May 19, 2003, p. 948.

Summers, Lawrence H., "Capital Taxation and Accumulation in a Life Cycle Growth Model," *American Economic Review*, vol. 71 (September 1981).

Tax Analysts, "Tax Analysts Files FOIA Request for Dividend Exclusion Revenue Estimate Records" 2003-6918, 2003 TNT 52-12, Mar. 4, 2003.

Thomas, William M., Letter to colleagues regarding the JCT macroeconomic analysis of H.R. 2, Doc 2003-12150, 2003 TNT 94-19, May 12, 2003.

Tuerck, David G., "The Why and What of Economic Models," *Veritas: A Quarterly Journal of Public Policy in Texas*, March 2002.

U.S. Department of the Treasury, *Report of the Department of Treasury on Integration of the Individual and Corporate Tax Systems*, January 1992.

Wilkins, John G., "Dynamic Revenue Estimating: Can It Work? Simulations of the Effects of Three Alternative Tax Systems," in *Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers*, JCS-21-97, Nov. 20, 1997, pp. 270-284.

TAX NOTES WANTS YOU!

Tax Notes has a voracious appetite when it comes to high-quality analysis, commentary, and practice articles. We publish more and better articles than anyone else, and we are always looking for more.

Do you have some thoughts on the American Jobs Creation Act? Fundamental tax reform? Tax shelters? Federal budget woes? Recent IRS guidance? Important court decisions? Maybe you've read a revenue ruling

that has flown under the radar screen but is full of traps for the unwary.

If you think what you have to say about any federal tax matter might be of interest to the nation's tax policymakers, academics, and leading practitioners, please send your pieces to us at taxnotes@tax.org.

Remember, people pay attention to what appears in *Tax Notes*.