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The Role of Dynamic Scoring in the Federal Budget Process:

Closing the Gap between Theory and Practice

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This paper discusses several issues that arise in the process of analyzing the macroeconomic effects of tax policy proposals in a way that is of practical use to legislators. In the current federal legislative process, much of the economic analysis of tax legislation boils down to a single set of numbers: an estimate of the effects of the proposal on projected federal revenues over the ten-year period following the current fiscal year. We discuss some of the practical aspects of developing a methodology for "dynamic scoring," or accounting for potential macroeconomic effects in the estimate of the revenue costs of a specific tax proposal. While there are many areas of theoretical debate and uncertainty in modeling the macroeconomic effects of tax policy, we discuss three often-overlooked practical issues in incorporating those effects in a revenue estimate: (1) translation of the tax proposal into inputs to a macroeconomic model that capture all the features of the proposal that are likely to have an impact on the economy; (2) adjustment of the tax and revenue related equations in the macroeconomic model to account for the difference between the actual present-law Internal Revenue Code and the specifics of the tax proposal being analyzed; and (3) reconciliation of differences in definitions of income between National Income and Product Account ("NIPA") data that macroeconomic models are typically calibrated to replicate, and the cash-basis income flows on which the present-law tax code is based. We show how the effects of proposed tax changes on GDP and revenues can vary depending on the methodologies chosen to address each of these issues.

I. Background

The estimate of the effects of a tax proposal on future federal budget receipts is often referred to as the "score" for the proposal. Under section 201(f) of the Congressional Budget Act of 1974, the Joint Committee on Taxation (JCT) is responsible for providing the official score for all legislation that changes the Internal Revenue Code. By longstanding convention, JCT revenue estimates are calculated assuming that estimated proposals would not change certain macroeconomic aggregates, such as labor supply, investment, and Gross National Product. (See JCT, 1995, for a description of JCT conventional revenue estimating methodology.) Congress is constrained in putting together a package of proposed tax changes, either by statute or by the rules they set for their own budget deliberations, to keep the total revenue cost for the package within pre-set targets. As a result, the score of a tax proposal can often have a large influence on whether it passes, and thus the methodology for determining the score is subject to intense scrutiny. One issue that is often raised is whether the score takes into account possible macroeconomic "feedback" effects.

In modeling the macroeconomic effects of tax policy, we bring to bear a familiarity with the intricacy of the Internal Revenue Code that comes with the scoring responsibilities of the JCT. This familiarity has led us to concentrate on the often overlooked technical details associated with how a tax proposal changes tax liability, which are the focus of this paper. Previous work, including JCT (1997, 2003), CBO (2002, 2003), and Diamond and Moomau (2003), has highlighted the importance of different types of modeling frameworks, behavioral assumptions, and assumed Federal fiscal and monetary policy responses in the macroeconomic analysis of proposed tax policy. While these issues are important, the technical details that are the topic of this paper can also have a significant influence on the outcome of the analysis.

II. Translation of tax policy into macroeconomic inputs

Tax policy can affect the economy, in the short run, through demand-driven effects on disposable income, and in the short and long run through effects on incentives to save, invest, and supply labor. Some macroeconomic models focus on the short-run effects of tax policy by modeling the anticipated changes in disposable income due to the policy. Typically these changes in disposable income are incorporated in macroeconomic models by changing one or more average tax rates in the model. Other models focus on taxpayer responses to changes in the after-tax returns to labor and capital due to changes in marginal tax rates. Still others incorporate both effects. The number of separately modeled flows of taxable income and separately modeled types of taxpayers varies substantially across models. (See Figure 1, JCT, 1997, for a summary description of the numbers of different sectors separately modeled in a representative array of macroeconomic models.) In performing macroeconomic analyses of tax policy, the JCT staff uses several different macroeconomic models in order to capture the variation in results across various modeling frameworks. (See JCT, 2003, for a description of these models.)

Because of the complexity of the current tax code, resulting from the combination of a progressive rate structure and numerous specialized deductions and tax credits, different tax proposals can affect taxpayers in similar income categories very differently. Effective average and marginal tax rate changes resulting from some proposals may differ significantly from the statutory changes. To calculate effective average and marginal tax rates under present law, and under the proposed tax policy change, the JCT staff uses microsimulation models based on large samples of tax returns weighted to match the taxpayer population, which are provided by the Statistics of Income ("SOI") Division of the Internal Revenue Service.

Generally, for use in the JCT staff's macroeconomic equilibrium growth (MEG) model, individual tax rates are separately calculated for wages, interest, rents, dividends, capital gains, proprietors' income, other individual income, and corporate income. Average tax rates for individual taxpayers are aggregated into average tax rates for each source of income by weighting each taxpayer's rate by his share of the total amount of that income source. Marginal tax rates are separately calculated for each of the individual income sources by increasing the income from that source for each individual, and re-calculating the individual's tax rate after the change in income. Average rates on total income and marginal rates on wage income are calculated separately for four categories of taxpayers for use in four separate labor force participation equations in the MEG model. Marginal tax rates on income from capital are included in the cost of capital equations, thus affecting the level of investment. Average tax rates are used to calculate receipts separately from the various types of taxable income. As the next section demonstrates, the extent to which tax rates are averaged across multiple income sources can have a significant effect on the outcome of the macroeconomic analysis.

III. Sensitivity of macroeconomic effects to aggregation of tax rates

In order to investigate the effects of including more finely disaggregated tax rates in the macroeconomic models, we use the JCT staff's MEG model to simulate three tax policy proposals, assuming four different levels of aggregation in calculating effective average and marginal tax rate changes. The first proposal allows taxpayers to exclude ten percent of wages from taxable income. The second proposal increases the amount of the personal exemption by 65 percent. The third proposal is an across-the-board individual tax rate cut of ten percent.

The three proposals have very different effects on average tax rates (ATRs) and marginal tax rates (MTRs). The ten percent wage exclusion proposal reduces the individual ATR by 8.8 percent and the MTR by 6.3 percent; it reduces the MTR on wages by 9.5 percent. The exemption proposal reduces the individual ATR by 5.8 percent, and the MTR by 1.5 percent; it reduces the MTR on wages by 1.3 percent. The across-the-board ten percent tax rate cut proposal reduces the ATR by 10.6 percent and the MTR by 10.3 percent; it reduces the MTR on wages by 10.0 percent.

For each of these proposals, we show the results of four simulations that differ in the extent of disagregation of tax variables in the behavioral and revenue equations in the MEG model. The table below shows the effects of these various proposals on real revenue feedback and real GDP. Revenue feedback is defined as the percentage reduction in the score of the proposal that would be a result of including macroeconomic effects. The first simulation in each panel shows the results of modeling the tax policy as a change in only one aggregate ATR: the tax rate on all individual income. The second simulation in each panel uses the same aggregate ATR as the first and one aggregate MTR, representing the MTR for all individual income, in all of the behavioral equations. The last two simulations in each panel include separately calculated average and marginal tax rates for each income source and labor supply group in the model's behavioral equations. Finally, unlike the first three simulations, the fourth uses separately calculated ATRs for each source of income in separate receipts equations for eight sources of income. For example, the ATR on wages is used to calculate receipts from wage income.

The level of aggregation of the tax variables in revenue and behavioral equations matters. Comparing simulations 1 and 2 shows that the distinction between average and marginal tax rates makes a significant difference for all three proposals. In general, because of the failure to capture incentive effects, using only an average tax rate will underestimate the feedback when the proposal affects marginal rates; and will overestimate the feedback when the proposal is inframarginal, like the personal exemption increase. Next, comparing simulations 2 and 3 demonstrates that using only one aggregate marginal tax rate overstates revenue feedback and GDP effects. Using only one rate over-attributes the rate cut that is actually applicable to certain preferentially-taxed sources of income, such as dividends. Similarly, a single marginal tax rate does not reflect the differential effects of rate cuts across different income groups, such as the four labor supply groups in the MEG model. Finally, allowing for separate average tax rates applicable to each source of revenue in simulation 4 makes a difference when some sources of income get significantly different rate cuts than others, such as occurs with the ten percent wage exclusion.

IV. Reconciling the difference in measured income between NIPA and SOI data

Macroeconomic simulation models are generally calibrated to data from the National Income and Product Accounts ("NIPA"). The NIPA measures of income are different from the amount of income reported as taxable to the Internal Revenue Service, which is reflected in the SOI data used in the JCT staff microsimulation models. The differences arise primarily because NIPA data include imputed income, accruals, and other income that is not taxable, while SOI data reflect the tax definition of income and expenses, as well as under-reporting of income by taxpayers. For this reason, average and marginal tax rates computed using the JCT microsimulation models cannot be directly applied to the NIPA income variables in our macroeconomic models. How the macroeconomic models are adjusted to account for such differences can have a significant impact on the results of the analysis.

We explore this impact using a computable general equilibrium overlapping generations model that includes perfect foresight (described in JCT 2003). We simulate a 50 percent reduction in tax rates on dividends combined with a 20 percent reduction in tax rates on capital gains (fully offset with reduced government spending) using two different approaches to calibrate NIPA and SOI data. In both approaches, the first step is to divide the SOI amount of each source of taxable income by the NIPA (or NIPA-compatible) amount to get a calibration ratio - in the case of dividend income, 30 percent. In the first approach, this ratio is used to scale the tax rate derived from the JCT microsimulation model so that baseline revenues match SOI revenues. This approach implicitly assumes that marginal income is divided between taxable and non-taxable income in proportion to the calibration ratio, and thus that only 30 cents of an additional dollar of dividend income is subject to the incentive effects of the tax reduction.

The second approach explicitly includes tax deferred saving in the model, and introduces an assumption that the marginal savings dollar is not contributed to deferred accounts. Contributions to tax deferred saving accounts are not included in the tax base, and the earnings of tax deferred assets are untaxed until withdrawal in the retirement period. Based on data on tax deferred wealth, we allocate 50 percent of income from dividends and capital gains to deferred accounts. A new calibration-ratio-adjusted tax rate is applied to the remaining 50 percent of income. This assumption changes the scaling of the dividend tax rate from 30 to 60 percent and implicitly assumes that 60 cents of an additional dollar of non-tax-deferred dividend income is subject to the incentive effects of the tax reduction.

The first approach yields an increase in GDP that is 3.2 percent smaller (a 5.9 percent increase versus a nine percent increase) than the second approach. The difference between the two approaches is more pronounced for the estimated revenue feedback. In the first approach, the revenue feedback from this tax policy change is 8.4 percent. In the second approach, the estimate of revenue feedback is 13.4 percent. Not surprisingly, it matters whether the factor that calibrates SOI and NIPA-based income is applied to the tax rate or to the taxable income base, because that decision determines to what extent the marginal dollar of income is assumed to be taxable. An added source of complexity in modeling tax policy is that the appropriate treatment of the calibration ratio will be different for each tax policy depending on which types of income or groups of taxpayers are targeted for tax relief.

V. Extensions for further work

In modeling the macroeconomic effects of tax policy, particularly for the purpose of analyzing their impact on revenues, the technical details in measuring tax rate changes and accounting for differences between taxable and economic income have real effects on the outcome of the analysis. Our efforts have focused on improving the level of detail of different taxable income flows in our macroeconomic models. JCT staff relies on tax return-based microsimulation models to maximize accuracy in estimating changes in effective average and marginal tax rates. However, it is not possible to use these models directly to simulate many of the proposals considered by Congress. For example, in the most recently passed tax legislation, "The American Jobs Creation Act of 2004" (JOBS), there were 138 separately estimated tax law changes. Many of the proposals required data not currently reported on tax returns, and thus required data and modeling that went beyond the use of JCT microsimulation models. For this type of proposal, calculating changes in average tax rates is relatively simple; but, extrapolating from this information to changes in marginal tax rates is less straightforward, and further work on developing a uniform methodology is necessary.

The JOBS act highlights another area for further work. Among the 138 proposals in the bill, the majority were designed to apply to small sub-sectors of the economy. Many tax proposals considered by Congress do not affect the entire universe of each source of taxable income, making it likely that many of the macroeconomic effects of such proposals come from the incentives they provide to re-allocate resources across sectors. Thus, further disaggregation to account for differential tax treatment within types of income would be desirable.

Footnote:

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Percent Change in Revenue Feedback and GDP
Relative to Baseline
(Fiscal Years 2005-09)

Ten Percent Wage Income Exclusion

Tax Rates in Model Equations: Behavioral	Tax Rates in Model Equations: Revenue	Revenue Feedback	GDP
ATR	ATR	3.8	0.044
ATR, MTR	ATR	7.7	0.128
Multiple ATRs & MTRs	ATR	5.7	0.103
Multiple ATRs & MTRs	Multiple ATRs	5.0	0.103

65 Percent Increase in Personal Exemption

Tax Rates in Model Equations: Behavioral	Tax Rates in Model Equations: Revenue	Revenue Feedback	GDP
ATR	ATR	3.7	0.037
ATR, MTR	ATR	1.7	0.010
Multiple ATRs & MTRs	ATR	1.4	0.004
Multiple ATRs & MTRs	Multiple ATRs	1.1	0.004

Ten Percent Across the Board Tax Cut

Tax Rates in Model Equations: Behavioral	Tax Rates in Model Equations: Revenue	Revenue Feedback	GDP
ATR	ATR	4.0	0.099
ATR, MTR	ATR	10.0	0.340
Multiple ATRs & MTRs	ATR	9.0	0.307
Multiple ATRs & MTRs	Multiple ATRs	9.0	0.306

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