SPECIAL REPORT

NOTES ON TAXES, GROWTH, AND DYNAMIC ANALYSIS OF NEW LEGISLATION

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I. Introduction

The effects of tax policy on economic growth have attracted long-standing attention among researchers and generated continual controversies in the policy arena. No one doubts that changes in tax policies can affect growth, both positively and negatively, but key uncertainties remain regarding the extent to which different policies would affect economic activity and the channels through which these effects occur.

Although the issues are not new (see the discussion in Bartlett 2002, for example), they have attained increased visibility in recent months, as the staff of the Joint Committee on Taxation convened a "Blue Ribbon" panel of economists to review its work on the modeling of the economic impact of tax proposals. Under current scoring rules, the JCT estimates the revenue effects of tax proposals allowing for a variety of behavioral responses regarding the timing and composition of economic activity, but not for changes that alter the real level of macroeconomic activity. For example, the impact of tax cuts on aggregate labor supply and investment is presumed to be zero in determining the revenue estimates. Under a system of dynamic scoring, the JCT would alter its revenue estimates to account for the feedback effects of the policies in question on the economy as a whole.[1] More formally, rule number XIII.3.(h) of the 107th Congress would have the JCT provide estimates of macroeconomic feedback effects as footnotes to the official revenue estimates, when requested by congressional leaders.

The public discussion regarding dynamic scoring has unleashed an enormous amount of angst and turmoil, including publicly released letters from congressional leaders to the JCT staff director. Proponents view dynamic scoring as a no-brainer — noting (correctly) that policymakers should have information on the growth effects of tax policy choices — and are veritably salivating at the prospect of massive new tax cuts, greased by favorable dynamic scores that misleadingly show little revenue loss, or even revenue gains. Opponents view dynamic scoring as a politically motivated effort to undercut the federal government's ability to finance needed programs, and complain that the effort is too complicated.

Both sides are missing some key points. Proponents fail to note that an accurate dynamic score would not necessarily show large, positive effects and could well show negative effects of tax cuts on growth. They also understate the difficulties of developing an accurate single estimate of the growth impacts. Opponents fail to note that the complexity, in itself, does not mean the information should not be provided, though it does have implications for how the information can best be packaged. Opponents also fail to note that similar problems arise under current revenue and distributional estimating procedures and are not unique to macroeconomic feedback issues.

This paper examines links between tax policy and economic growth and the implications for the role of dynamic scoring in the legislative process. Section II explores connections between tax policy and growth. It first reviews the various channels through which taxes can affect growth, then notes that several channels impart negative effects on growth and that several channels have not been well studied. Section III briefly outlines evidence from historical data, econometric studies, simulations, and surveys on the impact of taxation on growth, finding relatively small and mixed effects, reflecting in part the numerous channels and potential offsets noted above.

Section IV shows how analysis of the growth effects of the 2001 tax cut depends on at least four modeling choices: the underlying economic framework, and the

[1]The JCT also estimates the distributional effects of some taxes and some tax policy alternatives. As discussed below, for consistency, the distributional estimates should be adjusted to reflect macroeconomic feedback effects if the revenue effects are.

behavioral responses of private agents, the federal government, and other governmental entities — including the monetary authorities and state and foreign governments. Remarkably, the range of uncertainty is such that reasonable variation in any one of the modeling choices spells the difference between positive and negative impacts of the tax cut on growth, holding the other factors constant.

In Section V, the discussion turns to the use of information on taxes and growth in the legislative process. Policymakers should have information on the effects of their choices on economic growth, just as they currently have information on the revenue and distributional effects of policies. Dynamic scoring is one way to provide those estimates, and would be used to alter the official revenue estimates. As a result, dynamic scoring would require that a single number be provided for the growth effects, and hence the revenue effects, of a tax change. But if the goal is to provide policymakers with better information on the effects of policy changes, then a more reasonable approach would be to undertake what has been termed "dynamic analysis." This would allow the JCT to show policymakers how the tax policy would affect growth under a range of circumstances that accurately reflect the uncertainty surrounding policy choices. A unifying way to think about dynamic scoring is to ask what the most appropriate dynamic score of the 2001 tax cut would have been and the extent to which such a score would have reflected solid information versus analytical stabs in the dark.

Section VI provides a few concluding thoughts, focusing on the effects of rules regarding which programs should receive dynamic analysis, and noting similarities between problems in current revenue and distributional analyses and those that arise in studying macroeconomic feedback.

II. Taxes and Growth: Channels of Influence

Tax policy can affect the economy's underlying growth rate and/or create a onetime shift in the level of economic activity without affecting the rate of growth. Both effects change the size of the future economy and will be considered to imply an effect of taxes on economic growth.

Tax cuts influence the economy through several channels. First, they affect the behavior of individuals and businesses. The positive effects of tax cuts on growth arise because lower marginal tax rates raise the reward for working, saving, and investing. Holding real income constant, these lower marginal rates induce more work effort, saving, and investment through substitution effects. This is typically the "intended" effect of tax cuts on growth, and it is certainly the effect that is emphasized by advocates of tax cuts. But it is by no means the only effect, nor is it necessarily the largest effect. Tax cuts may also provide positive income (or wealth) effects, which reduce the incentive to work, save, and invest. An across-the-board cut in income tax rates, for example, produces both effects. It raises the marginal return to work — which tends to raise labor supply through the substitution effect — but it also raises a household's after-tax income at every level of labor supply — which tends to reduce labor supply through the income effect. Since the two effects work in opposite directions, the net effect on labor supply is ambiguous. Similar effects also apply to saving.

Tax cuts may also encourage tax avoidance responses in addition to — or instead of — the "real" responses noted above. Avoidance can involve changing the timing or composition of economic activity. This activity typically does nothing to raise long-term growth, even though it might generate a flurry of activity in response to a tax cut. Indeed, it could actually reduce economic growth by channeling resources to privately lucrative but socially unproductive activities and raising budget deficits (see below). Slemrod (1990) and others have argued that avoidance behavior is typically more sensitive to tax policy than is "real" behavior.

Besides their effects on private agents, tax cuts also affect the economy through changes in federal finances. In the absence of other policy changes, tax cuts are likely to raise the federal budget deficit, which may in turn reduce national saving,

the capital stock owned by Americans, and future national income.[2] Eventually any net tax cuts must be financed by some combination of future spending cuts or future tax increases, and those policy changes will influence the effect of the original tax cut on economic growth. Because fiscally unsustainable policies cannot be maintained forever, it is important to include the future financing of a tax cut as part of the effect of the tax cut itself.

Federal tax cuts can also generate responses from other governmental entities — including the monetary authorities, state governments, and foreign governments. If the Federal Reserve Board is targeting nominal GDP growth or following a Taylor (1993) rule,[3] a tax cut that boosts aggregate demand will be at least partially offset by monetary actions that raise interest rates. Likewise, federal tax cuts typically reduce revenue received by state governments, whose tax systems are tied to the federal system and who operate under balanced budget rules. As a result, state governments may respond by hiking taxes or cutting spending, either of which affects the size of the economy.

Tax cuts could also induce offsetting changes by foreign governments. Certain types of cuts in U.S. capital income tax rates would generate a significant capital inflow from other countries, if those countries do not respond. But if these countries try to restore their capital stock, cutting their own capital income tax rates by the same amount as the United States, there would be no net capital inflow.

In summary, while there is no doubt that tax policy can influence the economy, it is by no means obvious that a tax cut will ultimately lead to a larger economy. Tax cuts will reduce economic growth to the extent that they reduce national saving, create positive income or wealth effects, or generate restrictive reactions by monetary authorities or state or foreign governments.

The various effects noted above can interact in potentially surprising ways. For example, if an increase in expected future budget deficits raises current interest rates, then a phased-in tax cut can reduce growth. The impact of higher anticipated future budget deficits would be felt immediately via higher interest rates, but taxpayers' avoidance response could encourage them to postpone increases in real activity until tax rates fall in later years. *The Wall Street Journal* (2002) asserts that "delayed tax cuts depress the economy," and Elmendorf and Reifschneider (2002) obtain simulation results consistent with this view.

It should also be evident, however, that much more is known about some channels through which tax policy has effects than about others. The impact of taxes on labor supply, saving, and investment has been studied extensively, if not conclusively. In contrast, how future federal policy responds to current tax cuts and how state and foreign governments respond to federal tax changes have received little attention and are probably subject to even less consensus.

III. Taxes and Growth: Evidence

Because of the many channels through which tax policy affects growth and the potentially offsetting impacts, it is useful to examine a variety of forms of evidence on taxes and growth. Although some have claimed that tax cuts are a potent tool for raising growth (Calomiris and Hassett 2002; Jones, et al. 1993; National Commission on Economic Growth and Tax Reform 1996), a variety of forms of evidence produces less sanguine findings. A fair assessment would conclude that well-designed tax policies can raise growth, but there are many stumbling blocks along the way, and certainly no guarantee that tax cuts of any kind will improve economic performance.

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[2]The negative impact of deficits on long-term growth is not an issue of how deficits affect interest rates. Even if deficits have no impact on interest rates, they are likely to reduce national saving unless households are completely Ricardian (*see* Elmendorf and Mankiw 1999).

[3]The Taylor rule describes, under a certain set of assumptions about how the economy works, the best way for the Federal Reserve Board to adjust the money supply in response to various economic shocks, such as changes in the unemployment rate.

Table 1
Taxes, Spending, and Growth in Historical Perspective

Years	Federal Taxes as a Share of GDP (Percent)	Average Top Income Tax Rate (Percent)	Federal Spending as a Share of GDP (Percent)	Annual Growth Rate of GDP per Capita (Percent)
1870-1912	3.0	0.0	2.7	2.2
1947-1999	17.8	66.3	19.5	2.2
1912-1929	3.9	37.8	5.1	1.2
1929-1941	5.2	61.9	8.0	2.0
1941-1947	15.2	88.3	29.3	3.2
1947-1973	17.3	83.3	17.8	2.4
1973-1992	18.1	53.0	21.5	1.7
1992-1999	18.7	38.5	20.4	2.7

Source: Gale and Potter (2002).

Historical data show huge shifts in taxes with no observable shift in growth rates (Table 1). Most strikingly, from 1870 to 1912 the U.S. had no income tax and tax revenues were just 3 percent of GDP. From 1947 to 1999, the highest income tax rate averaged 66 percent, and federal revenues were about 18 percent of GDP. In addition, estate and corporate taxes imposed high marginal rates, and state taxes rose significantly over earlier levels (not shown). Nevertheless, the growth rate of real GDP per capita was identical in the two periods.

In formal tests, Stokey and Rebelo (1995) find no evidence of a break in growth patterns around World War II. Obviously, many factors affect economic growth rates, but if taxes were as crucial to growth as is sometimes claimed, the large and permanent historical increases in tax burdens and marginal tax rates might be expected to appear in the aggregate growth statistics.

Empirical studies of the growth effects of U.S. tax cuts are relatively rare, in part because the U.S. had only one major tax cut between 1965 and 2000. Feldstein (1986) and Feldstein and Elmendorf (1989) find that the 1981 tax cuts had virtually no net impact on economic growth. This may be surprising, given the incentives created by the large marginal rate cuts embodied in the 1981 tax cut. But the rate cuts also created income effects, and the act increased tax sheltering activities and the budget deficits, all of which would tend to depress growth.

Cross-country studies find very small long-term effects of taxes on growth among developed countries. Mendoza, et al. (1997) and Garrison and Lee (1992) find no tax effects on growth in developed countries. Padovano and Galli (2001) find that a 10 percentage point reduction in marginal tax rates raises the growth rate by 0.11 percentage points in OECD countries.[4] Engen and Skinner (1992) find significant effects of taxes on growth in a sample of 107 countries, but the tax effects are tiny and insignificant when estimated on developed countries.[5] Slemrod (1995) provides a careful critique of this literature.[6]

[4]Folster and Henrekson (2001) find no tax effects on growth in OECD countries. When they extend the sample to include high-income, non-OECD countries, they find a significant effect. But the regressions using tax variables do not control for spending, so it is not clear what the tax variable is capturing.

[5]Engen and Skinner (1992, Table 4, column 4). Statistical insignificance might be attributed to the fact that there are only 21 developed countries, but several of the other variables — including investment rates, initial income, labor force growth, and government spending growth — continue to be estimated precisely in the sample of developed countries.

[6]Blanchard and Perotti (1999) provide additional evidence but focus on short-term effects.

Simulation models offer a third approach to examining tax cuts. A simple extrapolation based on earlier published results from the Federal Reserve Board model of the U.S. economy implies that a cut in income tax rates that reduces revenues by 1 percent of GDP will raise GDP by 0.1 percent after 10 years (Reifschneider et al. 1999) if the Fed follows a Taylor (1993) rule for monetary policy.

Simulations based on endogenous growth models give a range of results, but also ultimately suggest small effects of tax cuts. Jones, et al. (1993) estimate that removal of all taxes would raise growth rates by 8 percentage points! Even a cursory glance at Table 1 rejects this conclusion. Stokey and Rebelo (1995) show that the Jones, et al. result is sensitive to a number of parameter choices and that the most defensible parameter values imply that flatter tax rates have little impact on growth.[7] Lucas (1990) obtains a similar result.

A fourth source of evidence is simply asking economists what they think. In a recent survey of 134 public finance and labor economists, the estimated median effect of the Tax Reform Act of 1986 on the long-term size of the economy was 1 percent (Fuchs, et al. 1998). Note that TRA '86 did not reduce public saving, so the growth effect was entirely due to changes in marginal tax rates and the tax base. The median response also suggested that the 1993 tax increases had no effect on economic growth. The 1993 act raised tax rates on the highest-income households, but also increased national saving, by reducing budget deficits.

Two other sources of evidence can be used to provide perspectives on the impact of taxes on growth. Gruber and Saez (2000) estimate an elasticity of "broad income" with respect to tax rates. Broad income includes more income than adjusted gross income and in particular includes reporting responses that may not represent changes in real activity. They find an elasticity of 0.4. This suggests that a 10 percent tax cut — which reduced the effective tax rate from 25 percent to 22.5 percent — would raise broad income by 1.33 percent. If broad income were 60 percent of GDP, GDP would rise by at most 0.8 percent. This overstates the effect, though, because some tax-induced rises in broad income — e.g., shifting income from corporations to households or from fringe benefits to cash income — do not raise GDP. Also, this estimate captures the behavioral response to improved tax incentives, but not the aggregate effect of declines in public saving. But a 10 percent decline in effective tax rates would reduce revenues by 1 percent of GDP, which would probably reduce national saving sufficiently to wipe out the positive effects due to the behavioral response to improved tax incentives (Gale and Potter 2002).

A final approach considers simulations of the growth effects of fundamental tax reform. Altig, et al. (2001) develop the most complete model of tax reform and find that the flat tax with transition relief would raise national income by 0.5 percent after 15 years. Without transition relief, the flat tax would impose a onetime wealth tax, and the economy would grow by 2.2 percent over 15 years. This comparison suggests that the bulk of the growth effects of consumption taxes are due to onetime wealth effects that might be imposed rather than the much-publicized changes in economic incentives at the margin.[8]

IV. A Case Study: The Effects of EGTRRA

Further insights on the effects of tax cuts on growth can be gleaned from a detailed examination of the Economic Growth and Tax Relief Reconciliation Act (EGTRRA) of 2001. The main features of the tax cut include:

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[7]Stokey and Rebelo (1995) find that Jones, *et al.* (1993) significantly overstate the elasticity of labor supply and depreciation rates for human and physical capital, all of which lead to overstatements of the impact of taxes on growth. In one simulation, for example, Jones, *et al.* (1993) find that labor supply broadly defined (specifically, non-leisure activities) would rise by 48 percent if taxes were repealed.

[8]*See also* Auerbach (1996), Joint Committee on Taxation (1997), and Judd (2001).

- phased-in reductions in income tax rates;
- phased-in expansion of the child credit;
- phased-in reduction and, at the beginning of 2010, repeal of the estate tax;
- temporary AMT relief for 2001-2004;
- a variety of retirement saving provisions; and
- complete repeal of the entire tax cut at the end of 2010.

Several studies have examined the impact of the 2001 tax cut on growth. The Congressional Budget Office (2001) concludes that EGTRRA may raise or reduce the size of the economy, but the net effect is likely to be less than 0.5 percent of GDP in 2011. Elmendorf and Reifschneider (2002) use the Federal Reserve macro model and find that a persistent cut in personal income taxes equal to 1 percent of GDP reduces long-term output and has only a slight positive effect on output in the first 10 years. They also show that delayed tax cuts can have negative effects on the economy. Auerbach (2002) estimates that the 2001 tax cut will reduce the long-term size of the economy unless it is financed entirely by spending cuts. After the first 10 years, the tax cut raises GDP by between 1 and 1.5 percent if it is financed by future tax increases. Gale and Potter (2002) estimate that EGTRRA will have little or no effect on GDP over the next 10 years and could even reduce it, and that GNP is likely to fall as a result of the decline in national saving.

To illustrate some of the issues that arise in developing these results — or the growth effects of any sort of tax cuts on economic growth — it is worth focusing on four sets of modeling choices:

- the underlying economic model;
- the parameters governing key private behavioral responses;
- the financing of the tax cut; and
- the response of other governmental entities.

The point of the exercise is not merely to demonstrate that estimating the impact of taxes on growth is complicated. Rather, the main theme is that, *for each modeling choice above, the range of reasonable specifications implies a range of tax cut effects on growth that spans both positive and negative outcomes, holding the other choices fixed.* For example, even if the underlying model, the parameter values, and the response of other governmental entities are specified, differences in how the tax cut is financed mean the difference between a positive and a negative predicted impact on economic growth. But the source of financing is typically unknown at the time of the tax cut.

Before turning to the documentation of these results, it may prove helpful to keep in mind the implication of the results for analysis of new legislation: namely, that a dynamic score of a revenue bill that focuses on a single number would be subject to a tremendous amount of uncertainty regarding its magnitude and even its sign, and would provide both less information and less reliable information than a dynamic analysis that conditioned the results on the parameter values and assumptions.

A. Economic Model

Economists use a variety of models to describe the economy. The models vary widely with respect to the level of aggregation or detail. They make different assumptions about households' decisionmaking, including how people form expectations, why people save, and the extent to which people can borrow. They make different assumptions about firms and the structure of markets, including the presence of market power and the speed with which prices and wages adjust to changes in supply and demand. They make different assumptions about international capital flows and financial markets. Although it is not the case that "anything goes" in terms of the assumptions made, it is nonetheless true that there is a range of professional opinion on the best way to model the economy.

To test the sensitivity of tax cuts to the underlying model employed, the CBO (2002) recently ran an experiment that examined the tax cut in four models that

Table 2
Tax Cuts and Growth: Sensitivity to Model Choice

Effects of Broad-Based Marginal Tax Cuts on Real GNP
(Average Annual Percent Change From Baseline)
Financed by Increase in Income Tax Rates After 10 Years

	Years					
	1-5	**6-10**	**11-15**	**16-20**	**21-25**	**26-30**
Stochastic OLG Model (Closed Economy)	0.2	0.6	-1.3	-1.7	-1.9	-2.1
Stochastic OLG Model (Open Economy)	0.2	0.7	-1.8	-1.9	-2.1	-2.2
Barro-Type Model	0.4	1.0	0.0	-0.3	-0.5	-0.6
DRI Model (Unemployment at Baseline)	-0.1	-0.2	-0.5	-0.5	-0.4	
MacroAdvisers Model (Unemployment at Baseline)	0.0	-0.3	-0.9	-0.8		
DRI Model (Full Keynesian Effect)	0.2	-0.1	-0.7	-0.4	-0.5	
MacroAdvisers Model (Full Keynesian Effect)	0.8	-0.4	-2.1	-0.2		

Source: Congressional Budget Office (2002).

differ in material ways. The models are listed in Table 2. In the stochastic overlapping generations (OLG) model and the Barro model, markets are always clear and output is determined by supply-side factors — capital, labor, and technology. A key difference between these two models is that changes in the timing of taxes are fully offset by changes in private saving in the Barro model, but not in the OLG model. The DRI and MA models represent so-called neoclassical synthesis models. In the long run, output is determined by supply-side factors, but in the short- and medium-term, markets may not clear because wage and price adjustments are sluggish, so that aggregate demand plays a role in determining output.[9]

For each model, Table 2 shows the effect of a tax cut modeled after the income tax cuts in EGTRRA, with the tax cut financed by a tax increase after 10 years. The table lists seven results because the OLG model can be run as an open or closed economy, and the DRI and MA models can be run with or without unemployment in the baseline.

The key result in Table 2 is that *whether the tax cut raises or reduces economic growth over the first 10 years depends on which model is employed*, holding constant the parameter values, the method of financing, and the response of other governmental entities. For example, in years 6-10, the OLG and Barro models yield positive effects on growth, but the DRI and MA models yield negative effects. A second result of interest is that growth in the first five years depends very strongly on whether there is unemployment in the baseline. The two models that allow unemployment find almost no effect on growth over the first five years. The other models have positive effects. Thus, the short-term effects of tax cuts on the economy are very sensitive to the assumed initial state.

B. Financing

The analysis of modeling uncertainty above holds constant the way the tax cut is financed. Table 3 shows the results of five different ways of financing the tax cut

[9]The model used by Auerbach (2002) is similar in many respects to the stochastic OLG model, while the Fed model used by Elmendorf and Reifschneider (2002) shares some common features with the DRI and MA models.

Table 3
Tax Cuts and Growth: Sensitivity to Financing

Effects of Broad-Based Marginal Tax Cuts on Real GNP
(Average Annual Percent Change From Baseline)

	Years					
	1-5	**6-10**	**11-15**	**16-20**	**21-25**	**26-30**
Stochastic OLG Model (Open Economy)						
Raise Income Tax Rates After 5 Years	0.4	-0.9	-1.0	-1.0	-1.1	-1.2
Raise Income Tax Rates After 10 Years	0.2	0.7	-1.8	-1.9	-2.1	-2.2
Raise Income Tax Rates After 20 Years	0.0	0.3	-0.2	-0.4	-4.1	-4.3
Cut Government Purchases Contemporaneously	0.0	0.6	0.7	0.8	0.8	0.9
Cut Government Purchases After 10 Years	-0.1	0.0	-0.4	-0.3	-0.2	-0.1
MacroAdvisers Model (Full Keynesian Effect)						
Raise Income Tax Rates After 5 Years	0.8	-1.5	0.2	-0.9		
Raise Income Tax Rates After 10 Years	0.8	-0.4	-2.1	-0.2		
Cut Government Purchases Contemporaneously	-0.3	0.9	1.3	1.4		
Cut Government Purchases After 10 Years	0.8	-0.4	-1.8	0.8		

Source: Congressional Budget Office (2002).

in the OLG model (open economy) and the MA model (full Keynesian effects). The key result in Table 3 is that *whether the tax cut raises or reduces growth depends on how the tax cut is financed*, holding constant the model used, the parameter values, and the response of other government entities. Typically, tax cuts financed by future tax increases lead to reductions in long-term growth. In the models included in Tables 2 and 3, tax rate cuts financed by cuts in spending lead to increases in long-term growth. (A related point, discussed below, is that the modeling of government spending is seriously incomplete in the models used in Tables 2 and 3.)

C. Parameter Values

To demonstrate that variations in parameter values that are within the range of professional findings can mean the difference between a positive and a negative impact of tax cuts on growth, I use data from Gale and Potter (2002). Gale and Potter use a reduced-form model, where output is a function of capital, labor, and technology. They estimate the impact of EGTRRA on the long-term size of the economy by combining (a) estimates from the literature on the sensitivity of labor supply, human capital accumulation, saving, and investment to tax rates with (b) JCT and Treasury estimates of how much EGTRRA changed marginal tax rates. They develop base case elasticities and an alternative formulation that substantially raises the elasticity of saving with respect to tax rates to the highest levels estimated in the literature.

Their results are summarized in the first panel of Table 4, and show that *whether the tax cut raises or reduces growth depends on whether the base case or alternative parameter values are employed*, holding constant the model, the financing, and the response of other governments.

D. Other Policy Responses

As noted above, federal tax cuts can induce responses by the monetary authorities, by state governments, and by foreign governments. Discussing the full range of responses is beyond the scope of this paper. Instead, the goal is to demonstrate that the sign of the effects of tax cuts on growth can depend on the type of policy response that is envisioned. Consider tax competition across countries. In the Gale-

Table 4
Tax Cuts and Growth: Sensitivity to Parameter Values and Policy Responses

Effects of EGTRRA on the Size of the Economy in 2011 (percent)

	GDP	GNP
Base-Case Assumptions	-0.31	-0.68
High Sensitivity	0.38	-0.04
High Sensitivity With Offsetting Foreign Tax Cuts	-0.04	-0.04

Source: Gale, William G. and Samara R. Potter. 2002. "An Economic Evaluation of the Economic Growth and Tax Relief Reconciliation Act of 2001." *National Tax Journal* 55(1): 133-186. And author's calculations.

Potter model above and in the models in Table 2, EGTRRA reduces national saving relative to investment and thus creates a capital inflow, assuming that other countries do not adjust their tax policy. These capital inflows finance domestic U.S. investment and raise GDP, though their effects on GNP are smaller, since the capital inflows have to be repaid to other countries via capital outflows in future years.

Precisely because these capital flows are valuable, however, other countries may take counteractions. If other countries reduced their tax rates on capital incomes by the same amount as the U.S. did, there would be zero net capital inflow. Estimates using this assumption in the Gale-Potter model in the bottom panel of Table 4 show that this would imply a decline in growth, even under the high-elasticity case. Thus, the key result is that *whether the tax cut raises or reduces economic growth depends on the response of other countrie*s (and monetary authorities and state governments), even holding constant the model, the parameter values, and the financing.

V. Dynamic Scoring Versus Dynamic Analysis[10]

The question addressed in this section can be roughly stated as follows: "What is the best way to provide policymakers with information on taxes and economic growth?" A more pointed way of asking the question is, "What would have been the best way to provide policymakers with an estimate of the effects of the 2001 tax cut on economic growth?" Those who favor dynamic scoring believe that the best way is to collapse the panoply of estimates and uncertainties above into a single number and report it as the "best guess" analysts can make. Those who favor dynamic analysis believe that a broader set of figures would provide policymakers more accurate, more honest, and ultimately more useful information.

A. The 2001 Tax Cut Once Again

There are several problems with dynamic scoring that do not arise with dynamic analysis, all of which can be discussed with reference to the 2001 tax cut, although similar questions would arise for analysis of other tax proposals. In each case below, dynamic scoring requires that a particular assumption be made and defended as the best available, whereas dynamic analysis allows a range of assumptions to be made and their implications traced out.

1. Model choice. Dynamic scoring requires that JCT choose one economic model of the economy to the exclusion of all others. This would not be a problem if the models all gave more or less the same effect, but as noted above, the models give results of opposite sign.

[10]Previous analyses of dynamic scoring include Aaron (1995), Auerbach (1996), Boskin (1995), Congressional Budget Office (1995), Feldstein (1995), Gravelle (1993, 1994, 2002), Greenspan (1995, 1997), Kies (1995), Lyon (1995), Mauskopf and Reifschneider (1997), and Paull (2002).

2. Behavioral responses. Even for well-studied areas, such as the effects of tax cuts on labor supply, there is a range of plausible estimates. Many behavioral responses, however, are almost entirely undocumented. For example, the 2001 tax cut reduces and eventually repeals the estate tax. But the effect of estate tax repeal depends on why people give bequests (Gale and Perozek 2001). The literature has been remarkably successful in rejecting all extant models of bequest motives (Gale and Slemrod 2001), and thus has not yet settled on anything approaching a consensus view. The empirical literature is also thin and inconclusive.[11]

3. Expectations. As enacted, the tax cut expires at the end of 2010. The extent to which people and business decisionmakers assume the tax cut would be extended would be likely to have a significant impact on economic behavior. This is particularly true with respect to the estate tax, which is scheduled to be repealed at the beginning of 2010 and then reinstated in 2011. Dynamic scoring requires that a particular assumption be made about expectations. Dynamic analysis only requires that the effects of different assumptions be traced out in terms of their economic implications.

4. Monetary policy response. If the Fed were targeting nominal GDP (effectively), then the rebate in 2001 had no effect on nominal GDP. That observation alone suggests that discussions of the stimulating effect of tax policy need to be qualified heavily. Dynamic scoring requires that one Fed reaction function be employed. Dynamic analysis shows the impact of the tax cut on growth under alternative reaction functions. Given that, even after the fact, it is not entirely clear what reaction function the Fed was pursuing, dynamic analysis seems a more prudent approach.

5. State and foreign government response. The cut in federal taxes reduced state taxes and forced states either to cut spending or to raise taxes. Likewise, any capital inflows created by EGTRRA's reductions in national saving could encourage other countries to "retaliate" by reducing their own capital taxes and thus reducing or eliminating the capital inflow. Dynamic scoring would require that some assumption about these responses be made before the policy is enacted. Dynamic analysis would be able to bound or provide a range of effects and show how the variation affected the outcome.

6. Financing. Perhaps the most important distinction between dynamic scoring and dynamic analysis arises with respect to questions about a how a tax cut will be financed. A net tax cut without a financing mechanism is only half of a policy; the financing is as much a part of the tax cut as is the original change in tax law itself. To be clear, if a tax change were revenue neutral, this issue would not apply.

The future financing of a tax cut is almost always uncertain. Under dynamic analysis, one could report that "if the tax cut is financed by a future increase in income tax rates, the effects would be x; if it is financed by a future reduction in government spending, the effect would be y." That is, in fact, what the analysis in Table 3 reports for two different models.

Under dynamic scoring, one would have to take a stand on the financing mechanism. This is problematic for several reasons. First, there is virtually no evidence available to provide such an estimate. Calomiris and Hassett (2002) find that about 25 percent of an unanticipated revenue shock turns into a change in discretionary spending.[12] This estimate, however, only applies to unanticipated revenue changes, and it combines

[11]Kopczuk and Slemrod (2001) note that their estimate confounds avoidance and saving responses. Holtz-Eakin and Marples (2001) find negative effects of estate tax rates on reported wealth, but the results are sensitive to alternative specifications.

[12]Their findings in log form suggest that a shock equal to 1 percent of revenues translates into a 0.5 percent change in spending, but since their average revenue figure is twice as large as their average spending figure, the log results imply that 25 percent of revenue shocks turn up as new spending in the next year.

inflationary and real shocks. Moreover, even if the results are taken at face value, the results do not provide information on how the rest of the financing gap is closed, nor do they indicate what type of spending is cut or the growth effects of that spending. To do a dynamic score, one would need to take stands on all of these issues. To undertake dynamic analysis, a range of assumptions could be provided.

In addition, dynamic scoring of fiscally unsustainable proposals would lead to a logical fallacy. Suppose it were determined on some basis that, on average in the past, each dollar of permanent tax cut resulted in a $1 reduction in spending in all future years. Now consider two different items being voted on by Congress: (a) a tax cut of $100 billion per year and (b) a tax cut of $100 billion per year coupled with a spending cut of $100 billion per year. *A dynamic score that made an assumption that all tax cuts led to spending cuts would score these two proposals exactly the same!* This would hold even though in the one case Congress was voting on a pure tax cut and in the other on a fiscally balanced reduction in taxes and spending.

B. Fundamental Tax Reform

The JCT (1997) convened several modelers to examine the macroeconomic feedback effects of fundamental tax reform. Unlike the effects of EGTRRA, the long-term effects of fundamental tax reform on growth were positive in all of the models. Two items should be noted, however, both of which suggest that the result may not hold for other analyses of fundamental tax reform. First, the models examined only very "clean" fundamental tax reforms. Aaron and Gale (1997) show that a pure flat tax would require a tax rate of about 21 percent. But if transition relief were provided to businesses, and if deductions for mortgage interest, health insurance, and charity were maintained, the required rate would rise to 27 percent. Likewise, if the earned income credit, state tax deductions, and business payroll deductions were maintained, the required rate would rise above 30 percent. The link between tax rates and growth effects in JCT (1997) and in Altig, et al. (2001) suggest that the higher-rate, narrower-base consumption tax reforms would be likely to reduce growth. A second problem with the models is that none of them considers responses from other countries. Yet if the United States were to exempt capital income from taxation, some response from other countries to reduce their own capital taxes and mitigate the inflow to the U.S. would be expected.

VI. Concluding Thoughts

A central conclusion of this paper is that the issues raised above make the effort to generate a single number — a dynamic score — for the macroeconomic feedbacks too uncertain, both in magnitude and potentially in sign, to be a useful input in the policy process. This in no way suggests that dynamic analysis is inappropriate. This section discusses a number of additional issues.

Which policies should receive dynamic analysis? The JCT scores hundreds if not thousands of proposals per year, so some selection rules must be provided. Tax cut advocates have pushed for having "large" tax cuts examined via dynamic analysis. This raises several concerns though. First, if the goal is to give policymakers better information about the relative costs and benefits of policy, the relevant concern should be the feedback effects relative to the size of the static costs, not relative to the size of the economy, suggesting that program size by itself is not a good method for determining eligibility. Second, if programs above some defined threshold are eligible for dynamic analysis and others are not, one should expect to see gaming of the rules to combine or separate different proposals in ways to make the scores look more favorable. Third, spending programs can also have effects on growth. Indeed, human capital is now seen as a critical determinant of economic growth (Mankiw, Romer, and Weil 1992). For all of these reasons, dynamic analysis that only focused on large tax changes would be subject to charges of political bias and fears of budget gimmicks.

Many of the issues raised above for dynamic scoring also apply to current revenue and distributional estimates. There is no question that both existing and proposed estimates are imprecise and leave out important factors. The relevant

question is how to proceed in light of those constraints. For purposes of consistency, it seems crucial, if one is going to assume that some sort of financing of tax cuts occurs in the future — i.e., via spending cuts or tax increases — that the revenue and distributional effects of those changes be reported as part of the analysis of the tax cut itself. For example, one goal of EGTRRA was apparently to reduce government spending. If a reduction in spending is included in dynamic scores, it should also be included in the distributional estimates. To the extent that the reduction in government spending affects low- and middle-income households disproportionately, inclusion of the distribution of the spending cuts would show the overall tax cut as even more regressive than implied by the distribution of changes in tax liabilities (Gale and Potter 2002).

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