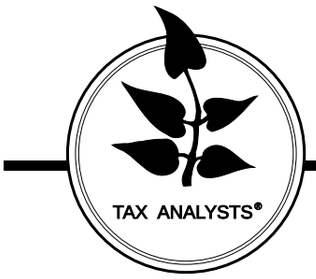

tax break

by Alan J. Auerbach, William G. Gale, and Peter R. Orszag

Reassessing the Fiscal Gap: The Role of Tax-Deferred Saving

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I. Introduction

It is by now conventional wisdom that the United States faces a sizable long-term fiscal gap. Under a wide range of scenarios, the projected costs of current spending programs substantially exceed projected tax revenues.[1] The fiscal gap has important implications for future generations and should inform current policy choices. For example, many observers believe that the size of the fiscal gap implies that the tax cuts enacted over the past few years have taken the country in the wrong fiscal direction.[2]

Boskin (2003) suggests the conventional wisdom regarding the long-term fiscal gap is incorrect. He claims that estimates of the long-term fiscal status largely or entirely omit revenue from tax-deferred saving plans, and that the omissions are almost as large as the projected budget shortfalls over analogous time periods. Specifically, he calculates that existing and projected tax-deferred saving will generate net revenue with a present value of $12 trillion through 2040 and $17 trillion through 2050. He concludes that "The total size may well rival the 75-year actuarial deficits in Social Security and Medicare HI, plus the national debt. An analysis of the underestimation of — more accurately, failure to consider — the long-run budgetary impacts of deferred taxes suggests that they will offset a sizeable share of the projected budget deficit through mid-century."[3]

Boskin's results have understandably generated substantial attention. The implications, however, have been widely misinterpreted.

Boskin's results have understandably generated substantial attention.[4] The implications, however, have been widely misinterpreted. This article reassesses the long-term fiscal outlook in light of Boskin's findings.

- Our central findings are easily summarized. First, the nation faces a substantial long-term fiscal gap, as conventionally measured. Second, even given the assumptions underlying Boskin's analysis, his projections of revenue due to tax-deferred accounts have only a modest effect on the long-term fiscal outlook because most of the relevant revenue is already incorporated into the budget projections. Third, Boskin's primary focus is the overall effect on the budget from tax-deferred retirement accounts, not the amount by which the budget projections understate such an effect. We find that his analysis substantially overstates the

[1] *See, e.g.*, Auerbach (1994, 1997), Auerbach and Gale (1999, 2000, 2001), Auerbach, Gale, and Orszag (2002), Auerbach, Gale, Orszag, and Potter (2003), Congressional Budget Office (2000), Gokhale and Smetters (2003), and Office of Management and Budget (2003).

[2] *See,* among others, Committee on Economic Development (2003), Kotlikoff and Sachs (2003), Kerrey, Nunn, Peterson, Rubin, Rudman and Volcker (2003), and Peterson (2003).

[3] Boskin (2003), p. 108. As discussed in greater detail in section VI, Boskin has indicated through a personal communication that he plans to revise these figures in a way that is likely to reduce the total net present value of revenues from tax-deferred accounts. Our article does not take those revisions into account. We appreciate the fact that Boskin has given permission for us to cite figures from his article.

[4] *See, e.g.*, Allen (2003), Bartlett (2003), Coy (2003), McTague (2003), and Sloan (2003).

likely overall budgetary impact from tax-deferred accounts.

- Our estimates, using the same methodology as in earlier work, imply a permanent fiscal gap under current policies of 7.55 percent of long-term GDP. This result implies that some combination of immediate and permanent tax increases and/or spending cuts that amount to more than $750 billion per year and rise with the size of the economy over time is necessary to achieve long-term fiscal balance. The fiscal gap can also be calculated for particular time periods. Between now and 2040, we estimate a fiscal gap of 2.25 percent of GDP.
- Boskin's projections of substantial revenues from tax-deferred accounts do not materially affect the long-term fiscal outlook. The main reason is simple: Almost all of the direct revenue effects that Boskin projects are already implicitly contained in the fiscal gap calculations. That is, Boskin's assertion that existing estimates of the long-term fiscal outlook do not include future taxes from retirement accounts is inaccurate. Given that fact, what matters for assessing the effect of tax-deferred plans on the nation's long-term fiscal gap is not the sheer magnitude of net revenues from that source (which is what Boskin estimates), but rather the extent to which that projected revenue stream is not already built into the calculations that generate the fiscal gap estimate.
- We find that the fiscal gap baseline already contains all of the contributions and about 85 percent of the withdrawals for tax-deferred accounts projected in Boskin's forecast. As a result, taking into account Boskin's projected growth in retirement accounts has only a very modest effect on the estimated long-term fiscal gap as conventionally estimated — reducing it from 7.55 percent of GDP to 7.38 percent of GDP. Between now and 2040, the adjustment reduces the fiscal gap from 2.25 percent of GDP to 2.07 percent of GDP.
- Boskin's projections include more than just the direct revenue implications of tax-deferred accounts; they also include indirect feedback effects associated with the impact of induced capital accumulation on revenues. In contrast, estimates of the nation's long-term fiscal status generally do not include feedback effects of large projected deficits. In calculating the net impact of Boskin's correction on the overall fiscal gap, one should incorporate feedback effects consistently. The approach taken in the adjusted fiscal gap estimates reported above is to exclude feedback effects. To emphasize our main point, however, that the net impact of Boskin's correction is small because most of it is already taken into account, we provide an unbalanced comparison in which we add the feedback effects from the additional revenue from withdrawals in Boskin's projections (compared to the taxes on withdrawals in the fiscal gap baseline) to the previous fiscal gap estimates. This change has little effect on the fiscal outlook. The fiscal gap through 2040, for example, falls to 2.03 percent of GDP, rather than to 2.07 percent.
- The bottom line for the long-term fiscal outlook is that plausible interpretations of Boskin's revenue calculations reduce the fiscal gap by about 0.2 percent of GDP. This adjustment is very small relative to the fiscal problems confronting the nation, and it changes no significant conclusion about the nation's fiscal status.
- The primary focus of Boskin's paper, however, is the overall projected budgetary effect from retirement accounts — rather than how much of that effect is already incorporated into budget projections. We find that his base case estimates of the overall budgetary effect from tax-deferred accounts are substantially overstated.

Section II defines the fiscal gap and provides updated estimates. Section III briefly outlines Boskin's revenue model. Section IV re-estimates the fiscal gap using Boskin's estimates of contributions and withdrawals from tax-deferred saving accounts. Section V estimates feedback effects. Section VI re-examines the foundations of Boskin's $12 trillion revenue projection. Section VII is a short conclusion.

II. The Fiscal Gap

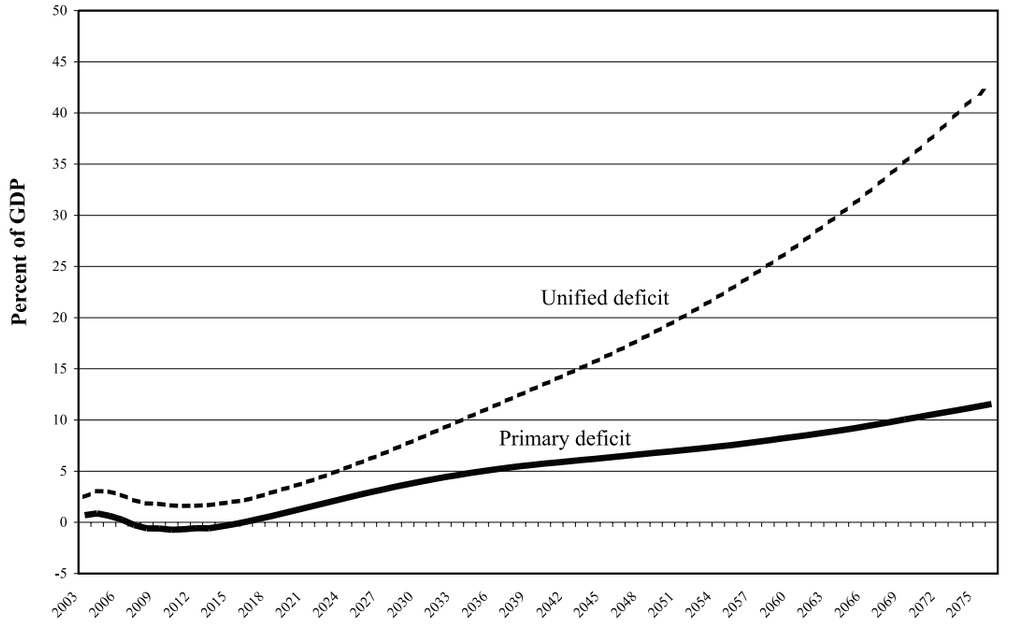
As developed by Auerbach (1994) and implemented in many subsequent analyses, the "fiscal gap" measures the size of the immediate and permanent increase in taxes and/or reductions in noninterest expenditures that would be required to set the present value of all future primary surpluses equal to the current value of the national debt, where the primary surplus is the difference between revenues and noninterest expenditures. Equivalently, it would establish the same debt-GDP ratio in the long run as holds currently. The gap may be expressed as a share of GDP or in dollar terms. The fiscal gap is an accounting measure that is intended to reflect the current long-term budgetary status of the government.[5]

To ensure that all government costs and revenues are included, and to avoid problems arising from omissions of deferred taxes and liabilities, requires that the fiscal gap be measured over an infinite horizon. Nevertheless, to permit comparison with other estimates, including Boskin's, we can also define a fiscal gap over a finite period. For example, the fiscal gap through 2040 measures the increase in taxes or cuts in noninterest spending that would be needed each year between now and 2040 to restore the 2040 debt-GDP ratio to the 2003 level.

[5]Auerbach, Gale, Orszag, and Potter (2003) discuss the relationship between the fiscal gap, generational accounting, accrual accounting and other ways of accounting for government.

Table 1: Effect of Retirement Plan Growth on Fiscal Gap Calculation (% of GDP)				
	Permanent	**Through 2075**	**Through 2050**	**Through 2040**
Fiscal gap	**7.55**	**4.55**	**2.99**	**2.25**
Adjusted for retirement plan growth				
At 20% tax rate	7.38	4.38	2.81	2.07
At 28.7% tax rate	7.31	4.30	2.74	2.00

Figure 1: Projected Primary and Unified Budget Deficits



Note: Budget deficits are reported on a NIPA basis.

A fiscal gap is defined only under a set of assumptions about future policies and economic growth. These assumptions require judgment and justification. In Auerbach, Gale, Orszag and Potter (2003), we justify the assumptions reported here. Following a dichotomy employed in most previous estimates of the fiscal gap, we project future policies and economic growth using somewhat different, but linked, methods for the first 10 years of the forecast period and for subsequent years.

Between 2004 and 2013, we begin with the Congressional Budget Office baseline figures for taxes and spending.[6] These figures are developed according to a variety of rules and customs and are not intended to reflect current policy in any but the most mechanical manner. Unlike the CBO baseline, we adjust tax revenues to allow all expiring provisions to be made permanent. We also raise the AMT exemption so that approximately 3 percent of taxpayers remain on the AMT in each year in the future.[7] We adjust discretionary spending so that it grows with inflation and the population.

After the first decade, we set the economy on autopilot. We use CBO projections of nominal GDP, with a

[6]We use the March 2003, CBO baseline for our calculations, the latest currently available. This may understate the magnitude of the fiscal gap somewhat, given the continued deterioration of the budget since March.

[7]Under current law, the AMT exemption for married couples filing jointly is $58,000 in 2003 and 2004, and falls to $45,000 in 2005. We assume that starting in 2005, the AMT exemption for couples filing jointly is raised to $70,000 and indexed for inflation. This maintains about 3 percent of taxpayers on the AMT through 2013.

nominal GDP growth rate that, after the initial forecast period, varies narrowly between 4.5 and 4.7 percent through 2077.[8] We assume that aggregate tax revenue (including taxes earmarked to pay for Social Security and Medicare) remains a constant share of GDP at its 2013 level. We also assume that discretionary spending remains constant as a share of GDP at its 2013 level. We assume that Social Security and Medicare expenditures follow the 2003 intermediate projections of the Social Security and Medicare actuaries as a share of GDP. We also assume that Medicaid spending grows at a rate determined by the growth of the population and per capita health care spending. Interest payments are determined by debt accrual and interest rates.[9]

Table 1 shows that the fiscal gap is 7.55 percent of GDP on a permanent basis, 4.55 percent of GDP through 2075 and 2.25 percent of GDP through 2040. This implies that under the set of policies described above, maintaining the ratio of debt to GDP indefinitely would require that taxes be increased and/or spending cut immediately and permanently by more than 7 percent of GDP (or more than 35 percent of the overall federal budget).[10]

Figure 1 plots the resulting time patterns for the primary budget balance and the unified budget balance as a share of GDP.[11] The growing budget shortfalls over time reflect a sharp projected rise in spending on Social Security, Medicare, and Medicaid — from about 9 percent of GDP in 2012 to 15 percent by 2040 and 21 percent by 2075. Because these programs grow faster than GDP, extending the horizon increases the fiscal gap.

Notably, the economic projections underlying the fiscal gap do not contain feedback effects of the exploding deficits. Figure 1 shows that the projected unified deficit rises from less than 5 percent of GDP in 2020 to more than 40 percent by 2075. At the same time, the CBO projections on which our fiscal gap calculations are based show nominal GDP — and presumably real GDP — continuing to grow smoothly (with a range between 4.5 percent and 4.7 percent). It is implausible to us that the reduction in national saving associated with such dramatically growing fiscal imbalances would be consistent with a relatively constant real GDP growth rate.

III. Boskin's Revenue Model[12]

Boskin describes several channels through which tax-deferred accounts affect the budget over time. The channels — along with Boskin's base case estimated effects on the net present value of revenue since the creation of the accounts through 2040 in parentheses — are:

- The contribution to traditional retirement accounts is tax-deductible, which reduces revenues at the time the contribution is made (-$7.1 trillion);
- Withdrawals are taxable, which raises revenue when the withdrawal is made (+$9.1 trillion);
- To the extent that contributions are financed by diverted saving, revenue on the taxable saving that would have occurred is reduced (-$1.2 trillion);
- To the extent that contributions generate net additions to national saving, the capital stock increases and the associated increase in future income raises revenue (+$6.7 trillion);
- All of these factors affect the debt held by the public, which in turn affects federal interest payments (+$5.5 trillion); and
- The change in debt payments affects income taxes on the interest (-$1.2 trillion).

The overall net present value of revenues from all these effects is about $12 trillion. These effects can be divided roughly into direct effects and feedback effects. The direct revenue effects are the lost taxes on contributions and diverted saving, and the taxes collected on withdrawals, holding the overall rate of capital accumulation fixed. The feedback effects allow for changes in the size of the economy due to these policies and include the resultant effect of increases in the capital stock on revenues, changes in public debt on federal interest payments, and changes in taxes paid

[8]Because our projections and discounting are based on nominal magnitudes, our estimates of the fiscal gap do not depend on how forecast growth of nominal GDP is decomposed into real growth and inflation. For reference, however, the long-run GDP projections adopted by the Social Security actuaries (Social Security Administration 2003, Tables V.B1 and V.B2) assume a similar nominal GDP growth rate and a GDP price index inflation rate of 2.7 percent.

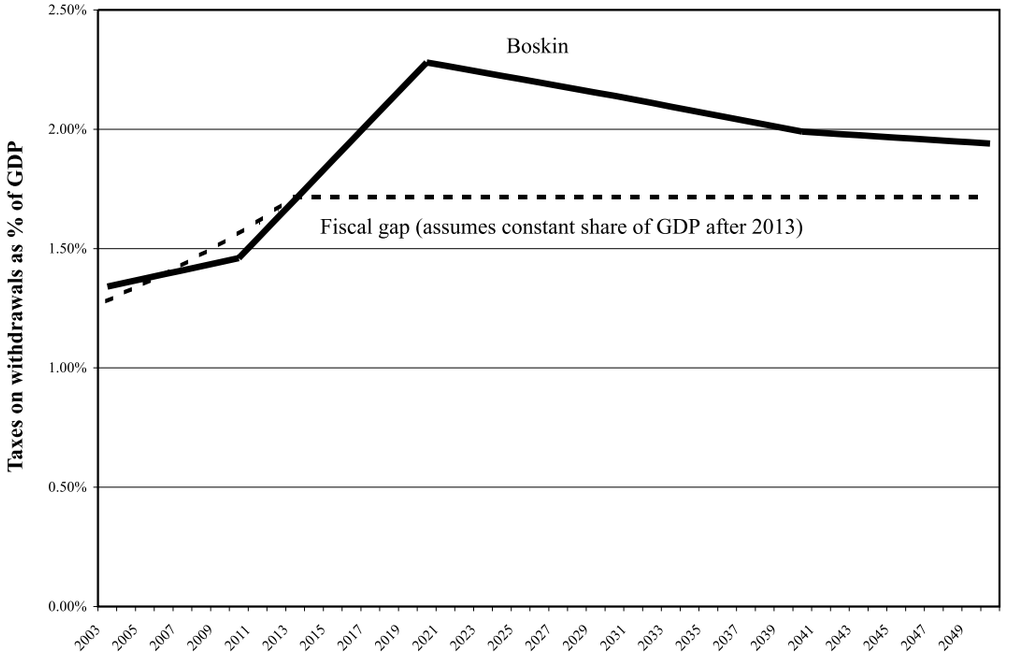
[9]We set each year's interest rate equal to the GDP growth rate plus the gap between discount and growth rates in the Social Security Administration's long-term forecast. This leads to a nominal interest rate that ranges between 5.8 and 6.0 percent.

[10]For comparison purposes, Appendix Table 1 reports the overall fiscal gap in dollars as about $59 trillion. This is larger than the $44 trillion figure reported recently by Gokhale and Smetters (2003), but the difference is primarily due to the fact that Gokhale and Smetters use a 3.6 percent real discount rate. Their estimated fiscal gap using a 3.3 percent real discount rate, which implies a nominal discount rate close to our nominal discount rate if one adopts the Social Security Trustees' inflation projection of 2.7 percent (see footnotes 7 and 8), is $58.6 trillion. More generally, however, fiscal gap calculations that are reported in dollars can be sensitive to the discount rate and the underlying economic projection. This sensitivity is dampened considerably when the fiscal gap is reported as a share of GDP because budget outcomes and GDP tend to move in the same direction under various scenarios. For that reason, we strongly prefer reporting the fiscal gap as a percentage of GDP. For further discussion, see Auerbach, Gale, Orszag, and Potter (2003) and Gokhale and Smetters (2003).

[11]Figure 1 helps show that the fiscal gap is different from the present value of projected budget deficits. The fiscal gap corresponds to the area below the primary budget line. The present value of expected budget shortfalls corresponds to the area below the unified budget line.

[12]Boskin's paper extends to more than 100 pages, covers a wide variety of issues, and provides extensive sensitivity analysis. Here, we summarize what we view as the main findings, including those that have attracted the most popular attention.

Figure 2: Taxes on Withdrawals From Retirement Accounts Assuming 28.7 Percent Tax Rate



on those federal interest payments. Notably, almost all of Boskin's revenue projections comes from feedback effects: The purported increase in the capital stock and the effect on reducing debt held by the public (net of the income taxes paid on debt payments) amounts to at least $11 trillion of the roughly $12 trillion total effect.[13]

IV. Modifying the Fiscal Gap Estimate

Our goal is to understand the implications of Boskin's analysis for the nation's long-term fiscal status. For that purpose, the absolute budgetary effect from tax-deferred saving plans — which Boskin estimates at $12 trillion — is not a relevant measure. What matters is how the estimated effect on the budget compares to what is already assumed in the fiscal gap in the first place. In other words, the key question is how much of the growth in retirement programs that drives Boskin's results is already embodied in the baseline used to estimate the fiscal gap. This question can be addressed by comparing the contributions and withdrawals in Boskin's revenue model to those implied in our fiscal gap calculations. This section carries out those comparisons and then estimates the impact of adjusting the fiscal gap calculation to include all of Boskin's projected withdrawals and contributions.

A. Withdrawals

Figure 2 shows projected taxes on withdrawals as a share of GDP in Boskin's model and in our fiscal gap baseline. The annual figures for Boskin's model are interpolated from data he presents and are reported in Appendix Table 2. For 2004-13, our estimates of taxable withdrawals are taken directly from the Tax Policy Center tax microsimulation model, and our GDP figures are based on CBO (2003).[14] For purposes of comparing our withdrawal patterns to Boskin's, we use the same tax rate on withdrawals (28.7 percent) that Boskin assumes. Our fiscal gap calculation assumes that after 2013 revenue is held constant as a share of GDP at its 2013 share. A reasonable interpretation is that this assumption also implies that after 2013 taxes

[13]We say "at least" here because, in an estimate that kept the capital stock fixed, the revenue cost associated with diverted saving would be higher than the $1.2 trillion reported above.

[14]Burnham (2002) projects withdrawals as a share of GDP that are very similar to our and Boskin's estimates for 2004-13 period and notes explicitly that his results are included in the CBO 10-year baseline.

on withdrawals from retirement accounts remain at their 2013 levels as a share of GDP.[15]

As Figure 2 shows, through the next 10 years, estimated taxes on withdrawals (using Boskin's 28.7 percent tax rate) are approximately the same in Boskin's model and in our fiscal gap baseline. By 2013, both Boskin's model and the fiscal gap baseline project that taxes on withdrawals will amount to 1.7 percent of GDP. After 2013, Boskin projects taxes on withdrawals will rise to 2.3 percent of GDP in 2020, before subsequently declining to around 1.9 percent of GDP by 2030. The implied difference in taxes on withdrawals between Boskin's model and our fiscal gap calculation averages about 0.25 percent of GDP between 2003 and 2040. Over the whole period, Boskin's calculation implies taxes on withdrawals averaging slightly more than 1.9 percent of GDP, while the baseline fiscal gap estimates imply taxes on withdrawals slightly less than 1.7 percent of GDP. In short, the fiscal gap calculations reported above already capture more than 85 percent of the taxes on withdrawals in Boskin's model.

The difference in taxes on withdrawals can also be expressed in dollar terms. Boskin (2003, table 5.4) projects that the present value of taxes on withdrawals will be $6.9 trillion in revenues between 2004 and 2040. Our fiscal gap baseline, using Boskin's assumed tax rate of 28.7 percent and his nominal discount rate of 5.3 percent, implies revenues of $6.1 trillion. Alternatively, both figures can be computed using the tax rate suggested by the Tax Policy Center model (20 percent) and a nominal discount rate consistent with those in our fiscal gap calculation (6 percent). Under those assumptions, Boskin's withdrawal rate generates a present value of $4.4 trillion in taxes, while our model generates $3.8 trillion. In either case, the fiscal gap baseline through 2040 already contains more than 85 percent of taxes on withdrawals that are in Boskin's calculations. These figures also show that, although most of the revenue is incorporated into the fiscal gap baseline, the present value of taxes on future withdrawals from these accounts is substantial. This implies that policies that reduce the taxation of those withdrawals could cause significant further deterioration in an already bleak fiscal outlook.

[15]A variety of other interpretations are possible. For example, under current law, overall revenues would rise, payroll taxes would decline and income taxes would increase as a fraction of GDP. Payroll taxes are levied on cash wages; because fringe benefits, which are not subject to payroll tax, are expected to increase as a share of GDP, while total labor compensation is projected to be roughly constant, the share of GDP taking the form of taxable wages is projected to fall. Income taxes would claim an increasing share of GDP over time, as bracket widths, personal exemptions, and the standard deduction are not indexed for increases in real incomes and the alternative minimum tax is not indexed for inflation or real growth. A full analysis of these various trends would involve a much broader analysis than is embodied in the Boskin paper. For the purpose of this analysis, we therefore make the simplifying assumption that the constant share of revenue assumption implies that income taxes forgone on contributions to, and collected on withdrawals from, retirement savings accounts remain a constant share of GDP.

B. Contributions

Boskin notes that contributions have been a fairly steady 8 percent of wages and salaries in the past and projects them forward at that rate through 2040. As a result, he projects taxes forgone on contributions at a constant 1.1 percent of GDP throughout the forecast period, as shown in Appendix Table 2. We do not have information on the implicit contribution rate embodied in the fiscal gap baseline, but it stands to reason that if contributions have been a steady share of wages and salaries, the CBO baseline would reflect this fact. Moreover, after 2013, Boskin's contributions remain at the same share of GDP as in 2013, which is exactly what the fiscal gap baseline would imply. The strong suggestion — though it is not proof — is that there are no new contributions to retirement saving plans in Boskin's model *relative to* the fiscal gap baseline.[16]

C. Fiscal Gap Recalculated

Table 1 shows two reestimates of the fiscal gap assuming that revenues rise in the fiscal gap baseline to incorporate the difference between taxes on withdrawals in Boskin's model and in the baseline fiscal gap calculations. One set of estimates uses Boskin's assumed 28.7 percent tax rate on withdrawals. The other set uses a 20 percent tax rate on withdrawals, based on estimates from the Tax Policy Center microsimulation model. Because we believe our tax rate estimates are more accurate than Boskin's 28.7 percent assumption, we focus on the fiscal gap estimates that are based on our tax rate, but the results are almost the same under Boskin's tax rate.

The adjusted fiscal gaps in Table 1 are only very modestly different from the conventional fiscal gap estimates, with the difference hovering around 0.2 percent of GDP over all time horizons when using our estimated tax rates. For example, on a permanent basis, the adjusted fiscal gap falls to 7.38 percent of GDP relative to our conventionally based estimate of 7.55 percent. Through 2040, the fiscal gap declines to 2.07 percent on an adjusted basis, relative to a conventional estimate of 2.25 percent.

Figure 3 shows the projected deficits in the unified budget in the fiscal gap baseline (the same as in Figure 1) and with an adjustment for Boskin's projected withdrawals. Figure 4 shows the projected primary deficits in the fiscal gap baseline and with an adjustment for Boskin's projected withdrawals. The two figures show clearly that the adjustment for withdrawals barely changes the level and certainly changes no important trend in projected fiscal outcomes.

All of these changes refer to how incorporating Boskin's projections would affect the fiscal gap that we

(Text continued on p. 574.)

[16]As noted in the previous section, another element of the direct revenue effects of tax-deferred saving plans is the revenue lost on saving diverted from taxable assets. Boskin's projections (in his Table 7.1) show that these forgone revenues are virtually constant as a share of GDP over time. Thus, the same conclusion that applies to projected contributions — that all of Boskin's projections are included in the long-term baseline that generates the fiscal gap — also applies to the taxes forgone on diverted saving.

Figure 3: Unified Deficits With and Without Adjustments for Additional Revenue From Retirement Account Withdrawals

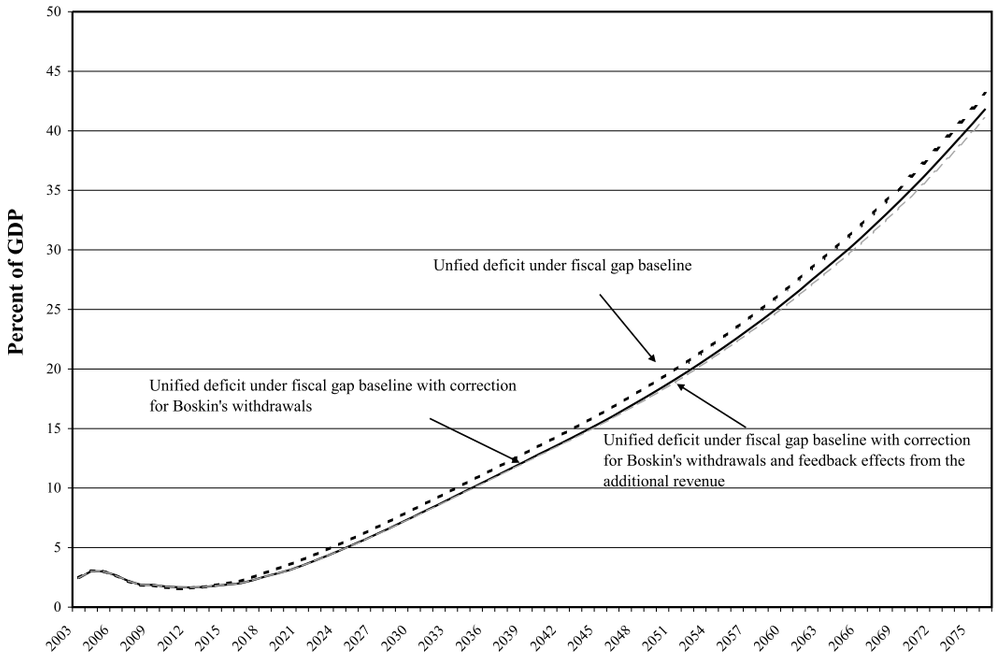
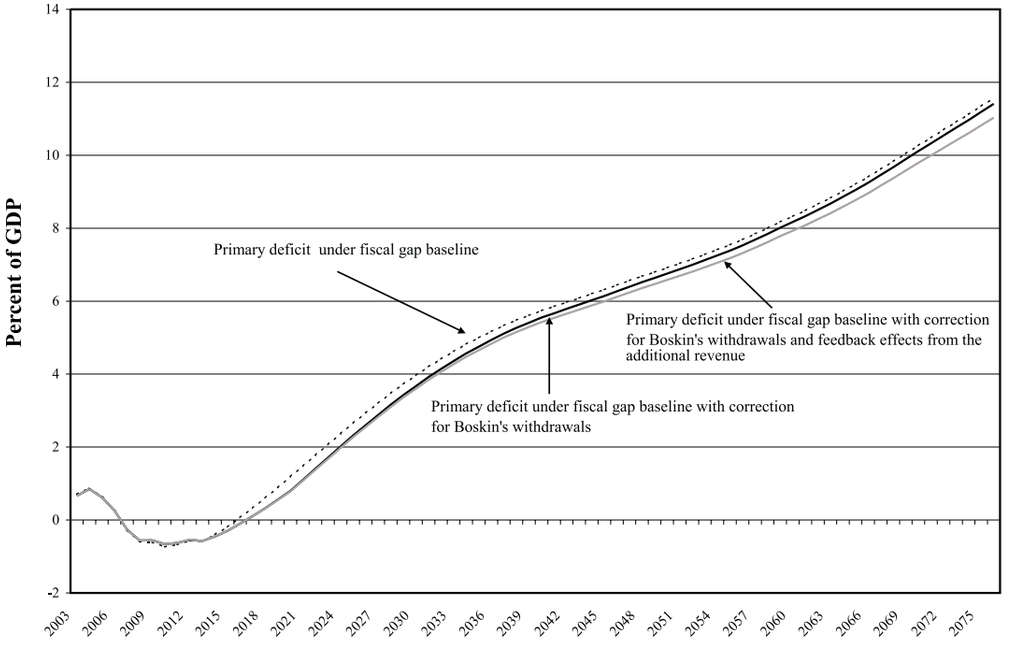


Figure 4: Primary Deficits With and Without Adjustments for Additional Revenue From Retirement Account Withdrawals



How Would Other Fiscal Gap Calculations Be Affected by Retirement Plan Growth?

Gokhale and Smetters (2003) use a different base case for revenues. Rather than assuming that revenues are constant as a share of GDP after 2013, they assume that individuals' tax payments depend on their age and sex (and that this function stays constant over time). Therefore, their base case presumably accounts for some portion of Boskin's estimated growing revenues from withdrawals beyond 2013, since their population projections reflect the aging of the baby boomers. Thus, the effect of explicitly incorporating Boskin's retirement accounts calculations in the Gokhale-Smetters analysis is likely to prove even smaller than the effect in our fiscal gap calculations, which hold revenues from withdrawals constant as a share of GDP after 2013.

The Congressional Budget Office also produces estimates of the long-term fiscal gap. CBO's long-run revenue assumption is sometimes described as setting long-term revenues equal to 19 percent of GDP (CBO 2002) and sometimes described as setting the long-term revenue-GDP ratio equal to the ratio in the 10th year of the CBO economic forecast (CBO 2000).[a] To the extent that the CBO projections follow the latter strategy, they reflect the same approach as our fiscal gap calculations. To the extent that the CBO projections follow the former strategy — setting the long-term ratio of revenues to GDP at 19 percent regardless of the revenue share of GDP in the 10th year of the forecast — the long-term fiscal gap estimates will differ somewhat from ours, but the impact of Boskin's revenue calculation is almost exactly the same.[b]

[a]CBO (2000) notes that the "long-term projections assume that tax receipts and discretionary spending remain constant as shares of gross domestic product after the projection period's first 10 years." CBO (2002) instead assumes that "the projections also assume for analytical purposes that aggregate federal revenues will level out at 19 percent of GDP in 2020, reflecting the higher end of the range over which they have fluctuated during the post-World War II period (18 percent was the average from 1950 through 2001)."

[b]Our forecast — which includes extension of expiring tax cuts and adjustment of the AMT — shows revenue equal to just over 18.0 percent of GDP in 2013, and taxes on withdrawals at 1.7 percent of GDP assuming a 28.7 percent tax rate. We assume that if long-term revenues as a share of GDP were instead set at 19 percent, all components of revenue would be increased by the same proportion. (An alternative assumption is that the allocation of revenues would be reset to correspond to historical averages, since the assumption that revenues are set at 19 percent of GDP is based on historical averages. We do not use this assumption for many reasons, most notably that it implies a return to a tax structure that would involve very large changes in 2013 in corporate revenues, payroll tax rates, income tax rates, etc.) Given our assumption, the fiscal gap unadjusted for Boskin's withdrawal projections would fall to 6.71 percent of GDP on a permanent basis and to 1.62 percent of GDP through 2040, since revenues after 2013 would be permanently higher by almost 1.0 percent of GDP. In addition, the imputed taxes on withdrawals in the fiscal gap baseline would rise proportionately, to 1.8 percent of GDP. This implies that the fiscal gap adjusted for Boskin's withdrawal projections would be 6.54 percent on a permanent basis and 1.43 percent of GDP through 2040. That is, using the assumption that revenues become 19 percent of GDP starting in the 11th year implies that the adjustments associated with Boskin's revenue effects would reduce the fiscal gap by 0.17 percent of GDP on a permanent basis and 0.19 percent of GDP through 2040. These are virtually the same as the adjustments shown in Table 1 under the assumption that long-term revenues remain just over 18 percent of GDP.

calculate. In the box above, we discuss why other approaches to measuring the fiscal gap are also unlikely to be altered significantly by incorporation of Boskin's calculations.

V. Modifying the Gap for Feedback Effects

As noted above, fiscal status calculations typically do not include feedback effects, but these effects account for virtually all of Boskin's $12 trillion revenue calculation. Boskin explicitly acknowledges the noncomparability of the two measures due to the existence of feedback effects.[17] In particular, as he notes, his revenue projections include feedback effects but the underlying fiscal gap does not — meaning that it is difficult to compare them directly. To generate a consistent comparison, the most straightforward calculation would omit feedback effects not only from the underlying fiscal gap calculation, but also from the adjustment to that calculation due to Boskin's projections. The previous section provides those estimates.

In this section, we supplement those findings by providing estimates of the feedback effects from revenues from retirement plan growth that are not already captured in the fiscal gap baseline. To be clear, we do not believe that dynamic effects should generally be incorporated for one component of the fiscal gap estimates, unless the other components are adjusted for feedback effects as well. Rather, our goal in this section is merely to calibrate the impact on the fiscal gap from incorporating both the direct effects outlined in the previous section and the feedback effects that are central to Boskin's revenue estimates.

The Appendix explains our approach in detail. Generally, we follow Boskin's specification of feedback effects and parameters, except that once again we generate two estimates, one with his assumed tax rates and one with ours. We focus on the feedback effects

[17]As Boskin (2003, p. 108) notes: "There are (at least) two important differences in the projections reported here and those of CBO and OMB. . . . Second, we include estimates of the effects on business income taxes and their effects on government debt. These grow noticeably relative to GDP, as reported in Table 7.1. As noted above, these effects are not explicitly separately included in the CBO and OMB figures. To the extent they were included, the deficits in the nondeferred tax part of the budget might decrease future business income taxes, raising deficits and interest outlays further. Alternatively, excluding the direct and indirect effects of business income taxes would lower our estimates considerably . . . ."

from Boskin's projected taxes on withdrawals that are not already reflected in the fiscal gap calculation. The feedback effects include those affecting (a) federal debt and interest payments and the taxes collected on interest payments on that debt and (b) the change in national saving and therefore the resulting change in the capital stock and taxes collected on the returns to capital.[18]

Incorporating the feedback effects due to additional revenue from retirement account withdrawals has quite minor implications for the fiscal outlook over the next 75 years. Figures 3 and 4 underscore how small the change in the fiscal outlook would be — the lines showing the budget deficits with feedback effects from retirement accounts included show no important deviations from the lines showing the budget deficit under the conventional fiscal gap adjustment. Including the dynamic effects from the additional revenue, the fiscal gap through 2040 would fall to 2.03 of GDP, compared to a conventional fiscal gap of 2.25 percent of GDP and a gap of 2.07 percent of GDP adjusted for taxes on withdrawals without the feedback effects. Even through 2075, the gap would fall by only 0.3 percentage points of GDP, from 4.55 percent of GDP under the conventional measure of the fiscal gap to 4.25 percent of GDP with all of the adjustments made. Appendix Table 3 provides the year-by-year estimates.

Incorporating feedback effects has a substantially larger impact on the fiscal gap over an infinite horizon. This finding says little about the overall effect of retirement saving accounts on the budget or the economy, however. Instead, it underscores that the underlying assumptions in Boskin's model generate substantial tax revenues when private capital replaces government debt in household portfolios. As discussed in the Appendix, this result occurs because the rate of return to capital is assumed to be substantially higher than the government interest rate, and the tax rate on capital is assumed to be higher than the tax rate on interest income. Thus, Boskin's estimates benefit from a sort of "tax arbitrage" that can make a range of policies look "good" but must be evaluated with great care, given the absence of an explanation for the source of these differences in tax rates and rates of return.[19]

[18]As above, we assume no difference between the fiscal gap baseline and Boskin's assumptions regarding the contribution rate to tax-deferred accounts or the forgone revenues on diverted saving. As explained below, we follow the assumption in Boskin (2003) that withdrawals from retirement accounts do not reduce the capital stock. Incorporating the more realistic assumption that withdrawals do reduce the capital stock would imply even smaller feedback effects than we obtain here, and quite possibly could make the sign of the effect negative.

[19]As an illustration, note that his paper shows that current assets in tax-deferred accounts amount to about $11 trillion. Applying to those balances the 28.7 percent tax rate he assumes suggests that if all of the assets were cashed in now, the government would receive $3 trillion in revenue. One would think that this would also be a reasonable estimate of the present value of revenues from these accounts. Assets

(Footnote 19 continued in next column.)

VI. Recalculating Net Present Value of Revenues

So far, the analysis has basically accepted Boskin's base case budgetary effects and examined the extent to which they affect the long-term fiscal gap. In this section, we examine the underlying assumptions more closely and conclude that the base case budget effects themselves are exaggerated, in particular because the feedback effects are exaggerated. Our re-analysis takes as given the differential rates of return between private and public assets that are discussed above.

A. Parameter Values

Boskin's feedback effects depend crucially on three parameters: the share of contributions to retirement accounts that represent net additions to national saving; the effect of an increase in national saving on domestic investment; and the tax rate on the income from increased investment. As discussed in the Appendix, economic theory and empirical evidence suggest that each of these parameters is specified in Boskin's calculations in ways that overstate the feedback effect. In particular, Boskin assumes that almost 50 percent of contributions to tax-deferred retirement accounts represent reductions in household consumption — that is, increases in national saving. We use a 30 percent or 40 percent figure, and even those may be too high based on the empirical literature to date. Boskin assumes that increases in national saving fully translate into increases in domestic investment. Based on the empirical literature, a more reasonable alternative is that about two-thirds of any increase in national saving manifests itself as an increase in domestic investment, with the other third increasing net foreign investment by Americans.[20] Finally, Boskin assumes that each dollar of capital income faces a marginal tax rate of 25 percent, whereas the 19 percent rate that we employ is probably an overestimate.[21] Other parameter values also affect Boskin's revenue estimate and appear to be mis-specified as well. For example, Boskin assumes

within the accounts should face a zero rate of tax on further accumulation (since the accounts apply the same tax treatment as a consumption tax), with additional deferral of taxes on delayed withdrawals just offsetting the higher level of taxes on the accumulated balances upon withdrawal. Unless the assumed rate of tax on withdrawals changes over time, the timing of withdrawals should not affect the present value of taxes collected from those accounts. (Allowing longer deferral of withdrawals does, however, reduce the present value of the revenue that would be collected in the assets if they had been withdrawn from the tax-advantaged amounts earlier and deposited in a taxable account.) Yet Boskin (2003, Table 6.7) finds that the current assets in retirement accounts will generate, in present value, $13 trillion in revenue through 2040 and presumably more thereafter.

[20]The increase in net foreign investment by Americans can take the form of increased American investment in other countries and/or reduced foreign investment in the United States. We assume that foreign investment in the United States and American investment overseas raise less revenue for the U.S. government than American investment in the United States (*see* the Appendix).

[21]Following Boskin, we do not consider how the extra capital created by new saving within tax-deferred accounts and by increases in tax revenues is allocated within the economy, or how this allocation affects the rate of capital income taxation or the before-tax returns to capital and labor.

that contributions are deducted at a marginal tax rate of 28.7 percent and withdrawals are taxed at the same rate. We use figures of 20 percent for each.

As shown in the Appendix, these adjustments make an enormous difference to the purported overall budgetary effect. Assuming that 30 percent of contributions to tax-deferred accounts represent net national saving, the adjusted parameters imply a present value of just $1.2 trillion in revenues through 2040 — one-tenth of Boskin's base case estimate. Even assuming that 40 percent of contributions are net national saving, along with the other adjustments to the parameters, implies the net present value of revenues from retirement plans will be $3.3 trillion through 2040, less than 30 percent of Boskin's base case estimate. In either case, the results are far smaller than the $12 trillion figure that Boskin obtains.

Almost all of the reduction comes from changes in the perceived feedback effects. In our $1 trillion and $3 trillion estimates, feedback effects account for $2 trillion and $3 trillion, respectively, far lower than the $11 trillion feedback effect contained in Boskin's $12 trillion revenue estimate.

B. Interest payments

Boskin's analysis includes the present value of the change in interest payments over time, as well as the change in the present value of revenues and noninterest expenditures. We do the same above, but only for purposes of recalculating Boskin's budget figure with different parameters. Including the net present value of interest payments is unconventional and can lead to misleading results. In particular, standard present-value projections of budget shortfalls properly exclude associated debt service costs. Those standard projections include the fiscal gap measure we report above, generational accounting, accrual accounting, the actuarial deficit in Social Security and Medicare, and so on. Ignoring the present value of changes in interest payments (and the taxes on those payments), the net present value of revenues from tax-deferred accounts falls to between $0.7 trillion and $1.9 trillion through 2040 (Appendix Table 5).

To see why inclusion of interest payments in present value calculations is misleading, consider a program that generates direct outlays of $x per year forever. If the interest rate is constant at level r, the present value of that stream of outlays is $x/r. Including associated debt service payments, however, the cost is $x(1+r) in the first year, $x(1+r)^2 in the second year, and so on. Discounting those costs yields a present value of $x(1+r)/(1+r) due to first-year costs, $x(1+r)^2/(1+r)^2 due to second-year costs and so on, with the implication that the present value of the outlay stream is infinite when interest accruals are included. Now consider two different direct outlay streams, one 100 times larger than the other. The present value of the smaller outlay, including interest, will far exceed the present value of the larger outlay excluding interest. As a result, comparing the present value of budget shortfalls — which typically exclude debt service payments — to the revenue stream from tax-deferred accounts, including the change in debt payments — can be extraordinarily misleading.

C. Feedback Effects

The feedback effects we calculate use adjusted parameters, but they are still too large because of an error in the programming of Boskin's estimates (Boskin, personal communication). In particular, the model in Boskin (2003) assumes that contributions to retirement accounts raise the capital stock but it ignores the fact that withdrawals would reduce the capital stock. Allowing withdrawals to reduce the capital stock would significantly diminish the feedback effect. In fact, since projected withdrawals exceed projected contributions in every year from 2003 forward in Boskin's model, the feedback effects taking withdrawals into account (and ignoring the interest payments) may prove negative.[22] If so, the overall net present value of the effect of tax-deferred accounts on the budget will prove negative (again, excluding interest from the present value calculations; see Appendix Table 5).

D. Summary

The calculations above suggest that the net present value of revenues from tax-deferred retirement saving plans — with parameter values adjusted, interest payments removed from the calculations, and feedback effects corrected to allow withdrawals to reduce the capital stock — is close to zero and could well be negative. Even these estimates may be overstated because they depend on the assumption, discussed above, that different assets will generate very different returns, even after taxes.

Notably, though, even in our estimates showing that the net present value of revenue is small, the *gross* present value of revenue due to taxes on withdrawals, taken by itself, remains substantial. As described above, the present value of revenue on withdrawals is projected to amount to almost $4 trillion between now and 2040.

VII. Conclusion

The United States faces a substantial fiscal gap. Although retirement assets are large and growing, most of the fiscal implications associated with that fact are already incorporated into the fiscal gap calculations. Policymakers and others looking to Boskin's (2003) results for a previously hidden pot of gold are thus likely to be disappointed. We estimate that explicitly incorporating the additional taxes associated with retirement accounts would reduce the long-term fiscal gap by only 0.2 to 0.3 percent of GDP, a relatively minor change since the fiscal gap amounts to more than 7 percent of GDP under our assumptions. Over the next 40 years, adjusting the fiscal gap to account for retire-

[22]Technically, the model assumes not that all contributions raise the capital stock but rather that the share of contributions that represents net additions to national saving raises the capital stock. The analogous assumption for withdrawals would be that the share of withdrawals that reduce the capital stock is equal to the share of contributions that raise the capital stock.

ment plans also alters the fiscal gap by only a small amount.

Boskin's paper is nonetheless valuable, in showing that the absolute magnitude of the revenue flows associated with withdrawals from tax-deferred accounts will be substantial. His results, therefore, imply that proposals to reduce the taxation of withdrawals from retirement accounts could significantly and adversely affect an already bleak fiscal outlook.

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Appendix

The appendix (A) describes Boskin's model, (B) discusses the base case parameter choices, (C) provides the methodology to consider feedback effects, (D) discusses alternative parameter choices, and (E) shows the sensitivity of Boskin's overall budget calculation to those alternative parameter choices.

A. How Tax-Deferred Accounts Affect Fiscal Outcomes

Boskin's model incorporates six distinct effects of tax-deferred saving accounts on the federal budget:

- Contributions to traditional retirement accounts are tax-deductible, which reduces revenues at the time the contribution is made. The revenue loss depends on (a) the level of contributions, which are modeled as a share of wages and salaries, and (b) the tax rate at which contributions are deducted.
- Withdrawals are taxable, which raises revenue when the withdrawal is made. The revenue gain depends on (a) the amount of withdrawals and (b) the tax rate at which contributions are taxed.
- To the extent that contributions are financed by diverted saving, revenue on the taxable saving that would have occurred is reduced. The revenue loss depends on (a) the share of contributions to tax-deferred saving accounts that is taken from existing assets or current-period saving that would have been done anyway, (b) the effective tax rate on that saving, and (c) the rate of return on private assets.
- To the extent that contributions generate net additions to national saving, the capital stock increases and the associated increase in future income raises revenue. The extent to which this occurs depends on (a) the share of contributions to tax-deferred saving accounts that represents net national saving — that is, is neither a tax deduction for the contribution or diverted from existing assets or other saving; (b) the share of increases in national saving that show up as increases in domestic investment; (c) the rate of return on that investment, and (d) the effective tax rate on the income from the investment.
- All of these factors change the revenue received by the government, which in turn affects the level of government debt, which in turn affects federal interest payments. Federal interest payments will fall (rise) if the net effect of the factors above is to raise (reduce) revenue.
- The change in federal interest payments will change income taxes. The amount by which income tax revenues change depend on (a) the change in federal interest payments and (b) the effective income tax rate on interest payments.

B. Base Case Parameter Values

In the base case, Boskin assumes that: contributions are a steady 8 percent share of total wages and salaries, which are fixed relative to GDP in the future; all balances are withdrawn at age 65; the nominal rates of return on equities and government bonds are 10 and 5.3 percent, respectively; the inflation rate is 3 percent; the tax rate on saving diverted from taxable forms into retirement accounts would have been 15 percent had it not been shifted; and the tax rate on interest paid by the government is 20 percent. We use these parameter values in the base case and the sensitivity analysis.

Other parameter values, which are amended in the sensitivity analysis below, include the assumptions that: each dollar of increased national saving creates a dollar of net additional domestic investment; 25 cents of each dollar of tax-deferred retirement account contribution is diverted saving; the tax rate applicable to contributions and withdrawals is 28.7 percent; and the tax on income from capital is 25 percent.

C. Feedback Effects

To examine the feedback effects from the incremental taxes on withdrawals, that is, taxes on withdrawals that exceed those already accounted for in the fiscal gap measure, we proceed as follows:[23]

Higher taxes on withdrawals generate a change in public debt and therefore taxes collected on interest payments; they also generate a change (through the budget balance) on the capital stock and therefore the taxes collected on the returns to capital. These are simp-

[23]As noted above, we follow Boskin in not incorporating the effect of withdrawals on private saving. Taking that effect into account would reduce the feedback effects relative to those presented here.

ly the last three effects listed in section A of this Appendix.

Consider a change to the primary budget balance in year one — due to higher than projected taxes on withdrawals. This causes a change in the unified budget balance, and therefore in both the stock of outstanding public debt and the level of national saving. The change in outstanding public debt affects interest payments (which in turn affect future unified budget balances) and thus income taxes paid on interest payments (which we include in the primary budget measure). The change in national saving affects the capital stock and therefore the taxes paid on capital income (we assume capital taxes apply to the nominal returns to capital after depreciation), which in turn affects the primary budget balance and the unified budget balance. A series of exogenous changes to the primary budget balance — which is one way in which to imagine incorporating the additional revenue identified by Boskin into the calculations — would thus generate a series of these effects.

In particular, a change in the unified budget (*UB*) is reflected in a change in debt held by the public (*D*):

$$\Delta D_t = -\Delta UB_t, \quad (1)$$

where an increase in *UB* is an increase in the unified surplus and therefore a reduction in publicly held debt.

The cumulative change in the debt causes a change in interest payments in year *t* equal to $r\sum_{s=0}^{t-1}\Delta D_s$, where *r* is the nominal interest rate paid on government debt. The change in interest payments then translates into a change in taxes on that interest in year *t* equal to $\mu_i r \sum_{s=0}^{t-1}\Delta D_s$, where μ_i is the average effective marginal tax rate on interest receipts.

The change in the unified budget balance in year *t* also translates dollar-for-dollar into a change in national saving and the capital stock (since we assume that $\gamma = 1$ here):

$$\Delta K_t = \Delta UB_t \quad (2)$$

The cumulative change in the capital stock determines the change in taxes on capital income in year *t*, which is equal to $\mu_b MPK\sum_{s=0}^{t-1}\Delta K_s$ where μ_b is the average effective marginal tax rate on capital income and *MPK* is the nominal marginal product of capital (net of depreciation, since we assume that nominal returns net of depreciation are subject to taxation).

The change in the unified budget balance is itself determined by four terms: the shock to the primary budget, the change in interest payments, the change in income taxes on those interest payments, and the change in capital income taxes:

$$\Delta UB_t = \overline{\Delta PS_t} - r\sum_{s=0}^{t-1}\Delta D_s + \mu_t r\sum_{s=0}^{t-1}\Delta D_s + \mu_\beta MPK\sum_{s=0}^{t-1}\Delta K_s \quad (3)$$

where the first term on the right-hand side of (3) is the exogenous change in the primary surplus in year *t* (in this case, the additional revenue on withdrawals relative to the baseline). Note that under the assumptions above, $\Delta K = -\Delta D = \Delta UB$ in each year. Equation (3) therefore collapses to:

$$\Delta UB_t = \left\{\overline{\Delta PS_t} + (\mu_\beta MPK - \mu_t r)\sum_{s=0}^{t-1}\Delta UB_s\right\} + r\sum_{s=0}^{t-1}\Delta UB_s \quad (4)$$

where the bracketed term on the right-hand side of (4) is the primary budget with dynamic feedback effects incorporated.

Equation (4) highlights that the "dynamic effect" on the primary budget in this simplified setting boils down to two offsetting channels. First, a positive shock to the primary budget (that is, a reduction in the primary deficit) reduces the public debt outstanding, which in turn reduces interest payments (which are excluded from the primary budget) and therefore reduces income taxes on the interest payments (the partial effect of which is to increase the primary deficit). Second, the same positive shock to the primary budget increases national saving and therefore increases the capital stock owned by Americans, which in turn increases capital tax revenue (the partial effect of which is to reduce the primary deficit). These two effects would exactly offset each other in dollar terms (assuming no change in interest rates) if the net marginal product of capital were equal to the interest rate paid on government debt and the tax rate on interest were equal to the tax rate on other returns to capital.[24] In that case, the additional tax revenue collected on the returns to the increased capital stock would be exactly offset by the additional tax revenue forgone on the interest payments from the reduced public debt — and the net effect of the primary budget would be zero. The total effect of the shock to the primary budget would thus be equal to the "static" effect. (The increase in the capital stock would still increase GDP in this case, so a dynamic analysis would imply a smaller fiscal gap relative to GDP.) In (4), if $\mu_b MPK = \mu_i r$, the effect on the primary budget in year *t* would collapse to $\overline{\Delta PS_t}$, which is identical to the "static" effect.

Boskin's base-case assumptions do not meet this condition, that is, the marginal product of capital multiplied by the tax rate on the return is higher than the interest rate on the debt multiplied by the tax rate on interest. In particular, Boskin assumes that the marginal product of capital after inflation and depreciation

[24]This invariance holds in the spreadsheet that generates the figures shown in Appendix Table 3. The results shown there would thus display no dynamic effect if these conditions obtained.

is 7 percent, that the tax rate on income (net of depreciation) generated from increases in the capital stock is 25 percent, that the tax rate on interest payments on federal debt is 20 percent, that the interest rate on government debt after inflation is 2.3 percent, and that the inflation rate is 3 percent.

These parameter choices also raise a deeper question. If the marginal product of capital exceeds the government interest rate only because of the risks associated with capital returns, and if the tax rates on the returns to different types of capital were the same, the "dynamic effect" would purely reflect a risk premium rather than a change on a risk-adjusted basis. If the tax rates on the two assets differ, this could also contribute to a net "dynamic" effect. But how one should account for revenues generated by differences in tax rates (which the government can control) or risk is not at all clear. We nonetheless adopt Boskin's parameter values (except for his tax rate on withdrawals, discussed below) for the dynamic effects shown in Figures 3 and 4 and reported in the main text.

D. Sensitivity Analysis: Parameter Values

Tax rates on contributions and withdrawals (μ_c and μ_w)

Boskin assumes that the marginal tax rate applying to both contributions and withdrawals is 28.7 percent. These figures are weighted averages of tax rates in the 2001 Survey of Consumer Finances, where the weights are based on households' retirement account balances and the tax rates are defined relative to adjusted gross income. We believe that this assumed tax rate on withdrawals is significantly too high. Data from the Tax Policy Center microsimulation model indicate that the average marginal income tax rate on taxable pension and IRA income is only about 17 percent in 2003, and will rise to about 19.5 percent by 2013. We set the rate at 20 percent in our alternative scenario.

We believe the assumed tax rate on contributions is too high as well. Because most households have higher income when working than in retirement, one might expect marginal tax rates to be higher during the working years, when contributions are made, than during retirement, when withdrawals are made. Boskin (p. 21), for example, notes that the effective tax rate on tax-deferred plans for working-age people is higher than for retirees. Nonetheless, we set the tax rate on contributions equal to the rate on withdrawals. Setting μ_c higher than μ_w would reduce the revenue effect of tax-deferred plans.

Tax rate on capital income (μ_b)

Boskin assumes that each extra dollar of domestic capital income bears an effective tax rate of 25 percent. Domestic capital is allocated to corporate, noncorporate business, and residential housing uses. Auerbach (2002, Table 3) estimated an overall effective tax rate on capital income of 19 percent, with the 2001 Bush tax cut fully phased in. We use this rate in our calculations below, even though it is probably an overestimate at this stage. Since the 2001 legislation, tax rates on capital gains and dividends have been reduced, accelerated depreciation provisions have been added, and rules regarding the tax treatment of intangibles have become more generous, all of which would reduce the effective tax rate. In addition, the calculations do not take account of tax sheltering activity. Finally, Auerbach's figure is an average economy-wide estimate, but the extra capital inside IRAs and 401(k)s would not be subject to the same personal-level taxes as funds in taxable accounts.

The share of increased national saving that becomes increased domestic investment (γ)

Boskin assumes that each extra dollar of increased national saving is invested in the United States. A more plausible assumption is that some of it flows overseas and is invested there. Over the long-term, changes in net foreign investment flows are estimated to account for between 25 percent and 40 percent of changes in national saving. For specific studies, see, among others, Feldstein and Bacchetta (1991), Feldstein and Horioka (1980), and Obstfeld and Rogoff (2000). For an overview of such studies, see CBO (1997).

If we assume that one-third of the added national saving flows out of the country, and that it faces a U.S. tax at one-fourth of the rate of domestic capital income (which does not seem implausible given the existence of the foreign tax credit and the ability to defer some taxes until the funds are repatriated), then $\gamma = .75$ would be appropriate.

The share of contributions that is diverted from other saving (α)

Contributions to tax-deferred saving plans come from three sources: the tax deduction, saving that would have been done anyway, and reductions in consumption. The final source represents the share of the contribution that represents new national saving. The first and final sources combined are the share of the contributions that is new private saving.

Boskin assumes that 25 percent of contributions come from diverted saving. Along with his imputed tax rate on contributions of 28.7 percent, this implies that 46.3 percent of contributions represent net additions to national saving. With an adjusted tax on contributions of 20 percent, the assumption that 25 percent of contributions are from diverted saving implies that 55 percent of contributions represent net additions to national saving. Both the 46.3 percent figure and the 55 percent figure are larger than almost all prior research on the topic.

The literature on IRAs has estimates that span a very wide range. Venti and Wise (1986, 1987, 1988, 1990, and 1991) find that between 45 and 66 percent of IRA contributions represent net additions to national saving, but other researchers find significantly smaller effects. Gale and Scholz (1994) find that almost none of the contributions that would arise from increased contribution limits would represent net additions to saving. Joines and Manegold (1995) estimate that less than 30 percent of IRA contributions represent net additions to national saving. Attanasio and DeLeire (2002) estimate that "at most 9 percent of IRA contributions represented net additions to national saving."

A similar divergence marks the literature on 401(k) plans. Poterba, Venti, and Wise (1995) find, essentially, that all 401(k) contributions represent increases in private saving, suggesting that roughly 80 percent of

contributions represents new national saving. All other studies have generated far smaller effects. Engen and Gale (2000), using a more general model that nests (and rejects) the Poterba, Venti, and Wise specification, find that between 10 percent and 30 percent of 401(k) contributions represent net private saving, suggesting that between -10 percent and 10 percent represent net national saving. Engelhardt (1999) finds that 401(k)s have no effect on private saving and thus by implication reduce national saving. Similarly, Pence (2002) is unable to detect a positive, significant impact of 401(k)s on private saving. Benjamin (2003) finds that 25 percent of 401(k) contributions are net national saving.

Thus, the two literatures follow a common theme. Research by Venti and Wise and Poterba, Venti, and Wise finds that 45 percent or more of retirement plan contributions represent net additions to national saving, but every other researcher that has explored the issue finds evidence that the correct figure is less than 30 percent, and most have obtained answers of 10 percent or less. For purposes of this calculation, then, we assume that 30 percent of contributions represent net national saving. This figure is an overstatement relative to most authors who have examined the issue and is slightly higher than the value chosen by Hubbard and Skinner (1996) in their review.[25]

As noted, our estimated tax rate on contributions is about 20 percent, in contrast to Boskin's 28.7 percent. This means that just to hold the share of contributions that are net national saving constant at the level Boskin assumes would require raising α by .087. To have 30 percent of contributions represent net national saving, requires setting α equal to 50 percent. We also examine a case with α set at 40 percent, which implies that 40 percent of contributions are net saving.

E. Sensitivity Analysis: Revenue Effects

The changes above have striking effects on the estimated net present value of revenues from tax-deferred saving plans. The first line of Appendix Table 5 reports Boskin's base case results. The effects of setting α = 0.5 are shown in the second line. The net revenue gain falls to $3.9 trillion. Relative to the base case, forgone revenues on diverted saving rise and feedback effects (involving more capital stock and less interest payments) decline.

The effects of setting γ = 0.75 (leaving α at its base case value of 0.25) are shown in the third line. The overall revenue gain is $8 trillion, including substantial declines in the feedback effect — the capital stock effect and the interest income effect — relative to the base case.

The fourth line shows that combining the assumptions α = 0.50 and γ = 0.75 generates an estimated net present value of revenues of $2.4 trillion. This represents our own calculations, rather than explicit results from Boskin's paper, and so it should be clarified. The taxes lost on contributions and taxes received on withdrawals do not change from the base case. Lost taxes on diverted saving rise to $2.4 trillion, as shown in the second line (where α = 0.5). To estimate the impact on the capital stock and associated revenue, we note that raising α from 0.25 in the base case to 0.50 in the second line reduces the capital stock effect by about 34 percent (to $4.4 trillion from $6.7 trillion) and reduces the interest effect by 36 percent (to $3.5 trillion from $5.5 trillion). To estimate the combined effect of raising α and reducing γ we make similar percentage adjustments starting from the γ = 0.75 case. That is, we reduce the capital stock effect by 34 percent (to $2.3 trillion from $3.5 trillion) and reduce the interest effect by 36 percent (to $0.6 trillion from $1 trillion). Taxes on interest income are 20 percent of the interest itself, and so fall to $0.1 trillion.

The final row shows that the effect of adjusting the assumed tax rates on contributions, withdrawals, and capital income to our preferred values is to reduce the net present value of revenue to $1.1 trillion. Setting μ_c and μ_w at 20 percent implies lost taxes on contributions of $5 trillion and taxes on withdrawals of $6.4 trillion. Reducing the tax on business income to 19 percent reduces the revenue from business income to $1.7 trillion. Note that the reduction in the tax on capital income should also reduce the interest income effect, but we do not make that adjustment because there is no obvious way to calibrate the adjustment without access to the underlying model.

A similar set of calculations, in the bottom panel of Appendix Table 5, shows that with the same set of adjusted assumptions but with α = 40 percent rather than 50 percent, the estimated net present value of revenues from tax-deferred accounts is just $3.3 trillion.

[25]In the long run, the share of contributions that represents net additions to national saving should rise. A simulation model, Engen, Gale, and Scholz (1994, p. 145) find that in the 70th year after implementation, about 50 percent of saving incentive contributions would represent net additions to national saving, but they also find that during the 50 years the effect on national saving is approximately zero. Thus, assuming 30 percent of contributions are net additions to national saving over the first 60 years seems like an overstatement, even relative to their simulation model.

Appendix Table 1: Effect of Retirement Plan Growth on Fiscal Gap Calculation ($ billion, present value)

	Permanent	Through 2075	Through 2050	Through 2040
Fiscal gap	59,720	21,512	10,662	6,716
Adjusted for retirement plan growth				
At 20% tax rate	58,421	20,710	10,041	6,195
At 28.7% tax rate	57,857	20,361	9,771	5,968

Appendix Table 2: Boskin's Assumed Revenue on Contributions and Withdrawals (percent of GDP)			
Year	Forgone revenue on contributions	Taxes on withdrawals assuming:	
		28.7 percent tax rate	20 percent tax rate
2000	**1.17**	**1.29**	**0.90**
2001	1.16	1.31	0.91
2002	1.16	1.32	0.92
2003	1.15	1.34	0.93
2004	1.14	1.36	0.95
2005	1.14	1.38	0.96
2006	1.13	1.39	0.97
2007	1.12	1.41	0.98
2008	1.11	1.43	0.99
2009	1.11	1.44	1.01
2010	**1.10**	**1.46**	**1.02**
2011	1.10	1.54	1.07
2012	1.10	1.62	1.13
2013	1.10	1.71	1.19
2014	1.10	1.79	1.25
2015	1.10	1.87	1.30
2016	1.10	1.95	1.36
2017	1.10	2.03	1.42
2018	1.10	2.12	1.47
2019	1.10	2.20	1.53
2020	**1.10**	**2.28**	**1.59**
2021	1.10	2.27	1.58
2022	1.10	2.25	1.57
2023	1.10	2.24	1.56
2024	1.10	2.22	1.55
2025	1.10	2.21	1.54
2026	1.10	2.20	1.53
2027	1.10	2.18	1.52
2028	1.10	2.17	1.51
2029	1.10	2.15	1.50
2030	**1.10**	**2.14**	**1.49**
2031	1.10	2.13	1.48
2032	1.10	2.11	1.47
2033	1.10	2.10	1.46
2034	1.10	2.08	1.45
2035	1.10	2.07	1.44
2036	1.10	2.05	1.43
2037	1.10	2.04	1.42
2038	1.10	2.02	1.41
2039	1.10	2.01	1.40
2040	**1.10**	**1.99**	**1.39**
2041	1.10	1.99	1.38
2042	1.10	1.98	1.38
2043	1.10	1.98	1.38
2044	1.10	1.97	1.37
2045	1.10	1.97	1.37
2046	1.10	1.96	1.37
2047	1.10	1.96	1.36
2048	1.10	1.95	1.36
2049	1.10	1.95	1.36
2050	**1.10**	**1.94**	**1.35**

Source for figures in bold: Boskin (2003), Table 7.1. Other figures are interpolated by authors.

Appendix Table 3: Feedback Effects from Additional Taxes on Withdrawals ($ billion)						
Year	Static change in primary budget	Feedback change in primary budget	Feedback change in unified budget	Feedback change in debt	Feedback change in capital stock	Feedback change in GDP
2003	(4.6)	(4.6)	(4.6)	(4.6)	4.6	0.6
2004	(3.3)	(3.3)	(3.6)	(8.2)	8.2	1.1
2005	(1.9)	(2.0)	(2.4)	(10.6)	10.6	1.4
2006	(0.1)	(0.2)	(0.8)	(11.4)	11.4	1.5
2007	1.9	1.7	1.1	(10.3)	10.3	1.3
2008	4.5	4.4	3.8	(6.4)	6.4	0.8
2009	7.4	7.3	6.9	0.5	(0.5)	(0.1)
2010	11.0	11.0	11.0	11.5	(11.5)	(1.5)
2011	7.7	7.9	8.5	20.0	(20.0)	(2.6)
2012	4.7	5.0	6.0	26.1	(26.1)	(3.4)
2013	1.3	1.6	3.0	29.1	(29.1)	(3.8)
2014	(9.4)	(9.0)	(7.4)	21.7	(21.7)	(2.8)
2015	(21.0)	(20.7)	(19.6)	2.1	(2.1)	(0.3)
2016	(33.7)	(33.6)	(33.5)	(31.4)	31.4	4.1
2017	(47.4)	(47.9)	(49.5)	(80.9)	80.9	10.5
2018	(62.4)	(63.6)	(67.9)	(148.8)	148.8	19.3
2019	(78.8)	(80.9)	(88.9)	(237.7)	237.7	30.9
2020	(96.4)	(99.8)	(112.6)	(350.3)	350.3	45.5
2021	(98.3)	(103.3)	(122.1)	(472.4)	472.4	61.4
2022	(100.2)	(107.0)	(132.3)	(604.7)	604.7	78.6
2023	(102.1)	(110.8)	(143.2)	(747.9)	747.9	97.2
2024	(104.0)	(114.7)	(154.8)	(902.8)	902.8	117.4
2025	(105.8)	(118.7)	(167.2)	(1,069.9)	1,069.9	139.1
2026	(107.6)	(122.8)	(180.3)	(1,250.2)	1,250.2	162.5
2027	(109.3)	(127.1)	(194.2)	(1,444.5)	1,444.5	187.8
2028	(110.9)	(131.5)	(209.1)	(1,653.6)	1,653.6	215.0
2029	(112.5)	(136.1)	(224.9)	(1,878.5)	1,878.5	244.2
2030	(114.1)	(140.8)	(241.7)	(2,120.2)	2,120.2	275.6
2031	(115.2)	(145.4)	(259.3)	(2,379.4)	2,379.4	309.3
2032	(116.2)	(150.1)	(277.9)	(2,657.3)	2,657.3	345.4
2033	(117.0)	(154.9)	(297.6)	(2,954.9)	2,954.9	384.1
2034	(117.7)	(159.8)	(318.5)	(3,273.4)	3,273.4	425.5
2035	(118.2)	(164.9)	(340.6)	(3,614.0)	3,614.0	469.8
2036	(118.4)	(170.0)	(364.0)	(3,978.0)	3,978.0	517.1
2037	(118.4)	(175.2)	(388.7)	(4,366.7)	4,366.7	567.7
2038	(118.1)	(180.4)	(414.9)	(4,781.6)	4,781.6	621.6
2039	(117.6)	(185.8)	(442.5)	(5,224.1)	5,224.1	679.1
2040	(116.7)	(191.2)	(471.7)	(5,695.8)	5,695.8	740.5

Appendix Table 4: Key Parameter Values in Base Case and Sensitivity Analyses			
Notation	**Description**	**Base Case**	**Alternative Value**
μ_c	Marginal tax rate for contributions	0.287	0.2
μ_ω	Marginal tax rate for withdrawals	0.287	0.2
α	Share of contributions from diverted saving	0.25	0.5-0.4
$1-\alpha$	Share of contributions that are new national saving	0.463	0.3-0.4
μ_b	Tax rate on capital income	0.25	0.19
γ	Share of new national saving that translates into increased domestic investment	1.00	0.75

Appendix Table 5: Net Present Value of Revenues From Tax-Deferred Accounts Through 2040 ($ trillion)								
	Total NPV revenue	**Lost revenue on contributions**	**Lost revenue on diverted saving**	**Tax on withdrawals**	**Tax on new capital income**	**Reduction in interest payments**	**Tax on interest payments**	**Source**
Panel 1								
Boskin base case	11.8	-7.1	-1.2	9.1	6.7	5.5	-1.1	Boskin, Table 5.4
Base case except $\alpha = 0.5$	3.9	-7.1	-2.4	9.1	3.5	1.0	-0.2	Boskin, Table 6.1
Base case except $\gamma = 0.75$	8.0	-7.1	-1.2	9.1	4.4	3.5	-0.7	Boskin, Table 6.3
Base case except $\alpha = 0.5$ and $\gamma = 0.75$	2.4	-7.1	-2.4	9.1	2.3	0.6	-0.1	Authors' calculations
Same but $\mu_c = 0.20$, $\mu_w = 0.20$, and $\mu_b = 0.19$	1.2	-5.0	-2.4	6.4	1.7	0.6	-0.1	Authors' calculations
Panel 2								
Base case except $\alpha = 0.4$	7.1	-7.1	-1.9	9.1	4.8	2.8	-0.6	Boskin, Table 6.1
Base case except $\alpha = 0.4$ and $\gamma = 0.75$	4.4	-7.1	-1.9	9.1	3.1	1.8	-0.4	Authors' calculations
Same but $\mu_c = 0.20$, $\mu_w = 0.20$, and $\mu_b = 0.19$	3.3	-5.0	-1.9	6.4	2.4	1.8	-0.4	Authors' calculations