Using Bracket Creep to Raise Revenue: A Bad Idea Whose Time Has Passed

by David Altig and
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Introduction

The Clinton administration, seconded by a majority in Congress as well as many economic experts, has made the adoption of new revenue sources a central element of its deficit reduction efforts. According to Congressional Budget Office (CBO) projections, over fiscal years (FY) 1994 to 1998, the federal government would borrow about $355 billion less under the Clinton budget proposals than if it merely continued with the tax and spending programs in place, or planned, at the beginning of FY1993. Almost 75 percent of this difference is accounted for by new federal receipts.[1]

However, even if the Clinton budgets unfold as envisioned, the federal deficit relative to gross domestic product (GDP) in FY1998 will differ little from the level realized in FY1989, the year just prior to the confluence of a protracted economic slowdown and the significant, but unusual, outlays associated with the savings and loan crisis. Worse yet, virtually all forecasts suggest that after FY1998, deficits will again begin to climb dramatically. Given these circumstances—and the probability that some of the tax changes currently on the table will be scaled back or rejected—it is likely that many of the revenue alternatives the administration has opted against will find their way back into policy deliberations in the near future.

One of the alternatives reportedly considered in the early stages of the Clinton team's budget deliberations was the suspension of adjustments to income-tax rate brackets that automatically occur when the Consumer Price Index (CPI) rises. In fact, this alternative has been periodically discussed ever since inflation indexation was introduced by the Economic Recovery Tax Act of 1981 (ERTA).[2]

The fact that monetary policy can influence government revenues is at the heart of traditional concerns about central-bank independence. Indeed, recognizing the temptation for governments to compromise long-run price stability in the service of short-run fiscal pressures is the key to understanding the history and

■ 1 See Altig and Gokhale (1993) for a detailed explanation of these estimates.

■ 2 See Tatom (1985) and Altig and Carlstrom (1991a) for more-detailed descriptions of these provisions.

evolution of centralized monetary institutions.[3] For those who, like us, believe that great skepticism should accompany any policy that introduces an inflationary bias into the economic environment, making government receipts positively related to the inflation rate is sufficient reason to be wary of abandoning indexation.

Quite apart from these considerations, however, is the simpler issue of efficiency. Suspension of inflation indexing raises revenues by permanently increasing the income base to which tax rates are applied. A straightforward alternative would be to continue adjusting the tax base for price-level changes while simultaneously increasing the applicable rates. The former approach is preferable to the latter only if the economic costs of allowing inflation to expand the tax base are less than the costs of increasing tax rates to levels sufficient to raise an equivalent amount of revenue.

In this article, we formally address this issue, asking whether, in the long run, the utility of an average consumer is higher when a given amount of revenue is raised by temporarily abandoning inflation indexation, as opposed to adopting a comparable, but explicit, change in the rate structure. Our analysis employs the well-known quantitative framework pioneered by Alan Auerbach and Laurence Kotlikoff (an extensive discussion of which can be found in their 1987 book *Dynamic Fiscal Policy*), and a rate structure similar to the one found in the current U.S. federal tax code. In all of the cases we consider, direct changes in tax rates are superior to the strategy of raising revenue by forgoing inflation adjustments.

Although a rising price level can affect tax liabilities in many ways, the channel relevant for our discussion is associated with bracket creep, or the tendency for taxpayers to be pushed into higher rate brackets as a result of inflation-induced increases in nominal income. In section I, we briefly review the specifics of indexation in the U.S. tax code, emphasizing the bracket-creep issue and its relation to another important effect of inflation, capital-income mismeasurement. Section II then illustrates the effect of suspending inflation indexation and contrasts this approach with one involving structural changes in the tax code. In section III, we lay out the basic model from which we calculate the welfare costs of bracket creep as a revenue source. The balance of the article contains our results.

I. What Does Indexation Really Index?

Indexation of the personal tax code formally commenced in 1985 under provisions of ERTA. Ad hoc indexation, in the form of infrequent adjustments of nominal tax brackets, personal exemption levels, and so on, was periodically legislated prior to 1985, but ERTA represented the first time that regular, ongoing inflation adjustments were codified in the tax laws.

Under ERTA, indexation required annual adjustments in the dollar value of tax-bracket limits and personal exemption levels based on a cost-of-living index derived from the Bureau of Labor Statistics' CPI for urban wage earners (CPIU). The indexing provisions of ERTA were in effect for only two years before being superseded by the Tax Reform Act of 1986 (TRA86). However, TRA86 extended ERTA's indexing scheme with only minor modifications.

The particulars of ERTA and TRA86 are such that inflation adjustments are made with a lag of approximately one year. For example, to implement inflation adjustments for tax year 1986, a cost-of-living index was calculated by dividing the average CPIU for 1985 by the average for 1984. The adjusted tax-bracket limits and personal exemption levels were then obtained by multiplying those in effect for the 1984 tax year by the resulting cost-of-living index. Thus, the procedure effectively adjusts the tax code in a given year using realized rates of inflation through the prior year.[4]

Because inflation adjustments are not contemporaneous, the accumulated effects of bracket creep might not be zero in any given year. However, if indexation is otherwise perfect, this is not an issue in the long run, which is the focus of our analysis. To clarify, suppose that real income is constant and equal to y, and that nominal income in year t grows by $1 + \pi_t$, where π_t is the annual rate of inflation. Ignoring exemptions, deductions, and other adjustments to gross income, the ERTA and TRA86 indexation schemes can be thought of as procedures that effectively deflate nominal income in each year by one plus the rate of inflation

3 A more complete articulation of this position is contained in the Federal Reserve Bank of Cleveland's 1990 *Annual Report*.

4 This statement is not precisely correct, since ERTA provided formulas for annual cost-of-living indexes that used October through September data.

BOX 1

The Effects of Bracket Creep: A Simple Hypothetical Example

Let the marginal tax-rate schedule be given by

Marginal Tax Rate (Percent)	Tax Bracket (Dollars)
0	0 – 1,000
25	> 1,000

If an individual has a constant real income of $1,000, the annual inflation rate is 3 percent, and indexation is suspended for two years, then the sequence of taxable income levels, marginal tax rates, and average tax rates is given by

Time	Nominal Income (Dollars)	Real Income (Dollars)	Nominal Tax-Bracket Limit (Dollars)	Marginal Tax Rate (Percent)	Average Tax Rate (Percent)
0	1,000	1,000	1,000	0	0
1	1,030	1,000	1,000	25	0.7
2	1,061	1,000	1,000	25	1.4
3	1,093	1,000	1,030	25	1.4
4	1,126	1,000	1,061	25	1.4
5	1,159	1,000	1,093	25	1.4
6	1,194	1,000	1,126	25	1.4
•	•	•	•	•	•
•	•	•	•	•	•

SOURCE: Authors' calculations.

for the *previous year*.[5] Thus, taxable income in year t is given by

$$y^* = y \prod_{j=1}^{t} \frac{(1+\pi_j)}{(1+\pi_{j-1})},$$

where we have designated the year in which indexing commences as time period 1. Because the long run, or steady state, is characterized by the condition $\pi_j = \pi_{j-1}$ (for all j), it is clear from the above expression that long-run taxable income just equals real income y if timing lags are the only flaws in the adjustment provisions.

Unfortunately, timing lags are not the only flaw; problems with our current indexation methods would exist even if all adjustments were contemporaneous. To see this, note that nominal income in year t, relative to year $t-1$ (which for simplicity we will henceforth assume is the base year), is given by

$$y_t = w_t(1+\pi_t) + R_t A_{t-1},$$

where w is real wage income, A is the household stock of assets (from the previous period), and R is the nominal rate of return on these assets. Real income, on the other hand, is given by

$$y_t = w_t + A_{t-1}(R_t - \pi_t)/(1+\pi_t).$$

Although deflating nominal income by $1+\pi_t$ is fine for obtaining real wage income, this adjustment is not appropriate for capital income. Specifically, dividing nominal asset income $(R_t \cdot A_{t-1})$ by one plus the inflation rate would result in an overstatement of capital income by an amount equal to $\pi_t A_{t-1}/(1+\pi_t)$.

This capital-income mismeasurement problem is logically distinct from the bracket-creep problem per se: Although distortions from bracket creep would vanish under a flat-tax regime, distortions from capital-income mismeasurement would remain. Furthermore, as shown, indexation as currently implemented does not address the problem of overstating real capital income in inflationary environments.

On the other hand, because capital-income mismeasurement does result in an overstatement of real income, it contributes to bracket-creep effects. In what follows, we provide calculations that examine the effects of suspending indexation with and without the capital-income mismeasurement problem.

II. Raising Revenue with Bracket Creep: A Simple Example

Bracket creep effectively raises the income tax base by an amount equal to the inflation rate realized for the period over which indexation is suspended. Although this point is fairly obvious, we provide a simple example to make the discussion a bit more concrete.

Suppose that the marginal tax-rate schedule is as described in box 1, that a representative taxpayer has a constant real income of $1,000, and that the price level increases by 3 percent every year. Treating time 0 as the base year, assume that indexation is forgone in years 1 and

5 Formally, the law requires that the income limits to which particular rates apply in year t be inflated by the factor P_{t-1}/P_b, where P is the appropriately defined CPIU and b refers to the base year used in the adjustment. However, because P_{t-1}/P_b just equals $\Pi_{j=b+1}^{t-1}(1+\pi_j)$, the indexing procedures are equivalent to holding the rate limits constant and adjusting nominal income as described.

2. As shown in the box, in the long run (after period 2) this policy causes nominal income to exceed the 0-percent rate bracket by about 6 percent in every period. As a consequence, the marginal tax rate faced by our average taxpayer is higher from time 1 onward, even though real income is unchanged.

Reflecting the simple two-bracket rate structure proposed in this example, temporarily shelving inflation adjustments for two years (or longer) has exactly the same effect on *marginal* tax rates as would a one-year suspension: In both cases, the marginal tax rate rises from 0 to 25 percent. However, as seen in the last column of the second table in box 1, the *average* tax rate increases as long as indexation is suspended. This reflects the fact that inflation expands the amount of income subject to the 25 percent rate, even when the marginal rate itself does not change.[6]

III. A Quantitative Framework

In subsequent sections, we quantitatively compare the long-run effects of raising revenue through bracket creep with those that arise from raising the same amount of revenue by proportionately increasing statutory marginal tax rates. The analysis uses a general-equilibrium overlapping-generations model, similar to that of Auerbach and Kotlikoff (1987), in which individuals face a tax-rate schedule and indexing scheme much like those legislated by TRA86. In this section, we outline the model's structure and discuss its parameterization. More-detailed discussions of similar frameworks can be found in Auerbach and Kotlikoff and in Altig and Carlstrom (1991b, 1992).

Preferences and the Budget Constraint

Assuming that productive life starts at age 1, a representative member of each generation in the model's steady state maximizes a time-separable utility function of the form

$$(1) \quad U = \sum_{s=1}^{55} \beta^{s-1} \left(\frac{c_s^{1-\sigma_c}}{1-\sigma_c} + \alpha \frac{l_s^{1-\sigma_l}}{1-\sigma_l} \right)$$

subject to

$$(2) \quad A_s = 1 + r_s(1-\tau_s) A_{s-1} + \varepsilon_s \omega (1-\tau_s)(1-l_s) - c_s + T_s,$$

where c_s is real consumption expenditure at age s, l_s is leisure (where the total time endowment has been normalized to one), r is the pre-tax real interest rate $(R-\pi)/(1+\pi)$, ω is the pre-tax real market wage, ε_s is an exogenous human capital productivity endowment, τ_s is the individual's marginal tax rate, and T_s is a lump-sum transfer payment equaling the individual's total tax payment.[7] The parameters σ_c and σ_l represent, respectively, the inverse of the intertemporal elasticities of substitution in consumption and in leisure. The parameter β is the subjective time-discount factor, given by $1/(1+\rho)$, where ρ is the rate of time preference.

Capital and the Production Technology

The aggregate production technology is of the standard Cobb–Douglas form

$$(3) \quad Y = Ak^{\theta},$$

where Y is aggregate output per unit of labor, A is an arbitrary scale variable, k is the aggregate capital–labor ratio, and θ is capital's share of production. The steady-state value of the capital stock satisfies

$$(4) \quad k = \frac{Y - C}{n + \delta},$$

where C is aggregate consumption per labor unit, n is the rate of population growth, and δ is the rate of depreciation on physical capital.[8]

■ 6 Simulations in this paper consider the effect of bracket creep only on marginal tax rates. Because tax revenues are returned to agents in a lump sum, increases in tax revenues that are independent of marginal tax-rate hikes have no effect in equilibrium.

■ 7 The basis for the human capital productivity profile is the labor efficiency estimates reported by Hansen (1986). We transformed Hansen's discrete function into a continuous function by linear extrapolation. Because we will be focusing exclusively on steady states, we have dropped time subscripts for expositional convenience.

■ 8 Equation (4) is obtained from the goods-market-clearing condition

$$Y_t = C_t + (1+n)k_{t+1} - (1-\delta)k_t$$

and the requirement that $k_{t+1} = k_t$ in a steady state.

TABLE 1

Benchmark Parameters

Parameter	Description	Value
$\frac{1}{\sigma_c}$	Intertemporal elasticity of substitution in consumption	1.000
$\frac{1}{\sigma_l}$	Intertemporal elasticity of substitution in leisure	0.200
ρ	Subjective rate of time preference	0.010
α	Utility weight of leisure	0.500
n	Population growth rate	0.013
θ	Capital share of output	0.360
δ	Capital depreciation rate	0.100

SOURCE: Authors.

Model Calibration

As a benchmark, the parameters in equations (1) through (4) are set at the values shown in table 1. Given the tax code described below and interpreting a time period as one year, these parameters yield a steady-state capital/output ratio of 2.59, compared to 2.68 for the U.S. economy over the post–World War II period.[9] With respect to the labor supply, our benchmark parameterization implies that, on average, individuals spend about 28 percent of their total time endowment in market-wage-generating activities. How this matches the actual data depends on the total hours that individuals have available for leisure. If we assume that an average of six hours per day is required for sleeping, over the postwar period U.S. workers have devoted approximately 31 percent of their available time to market-labor activities.[10]

The Benchmark Tax Code

Throughout the remainder of this paper, we focus specifically on the pure distortionary effects of the different tax regimes considered. Accordingly, we assume that all revenues raised through income taxes are rebated to the affected cohort via lump-sum transfers, so that both income-tax payments and lump-sum transfers are given by

$$(5) \qquad T_s = \begin{cases} \tau^L y^* & \text{for } y^* \le \bar{y} \\ \tau^L \bar{y} + \tau^H (y^* - \bar{y}) & \text{for } y^* > \bar{y}, \end{cases}$$

where y^* is taxable income and $\bar{y}$ defines the maximum level of taxable income for which the lower *marginal* tax rate, τ^L, is applicable.

In the benchmark case, we choose $\tau^L = 0.15$, $\tau^H = 0.28$, and set $\bar{y}$ using the 1989 tax schedule for married persons filing jointly. Appendix 1 explains how we calibrated the model to this tax schedule.

Solving the Model

The model is solved using numerical techniques. Our procedures involve conjecturing values for the aggregate capital stock and labor supply, calculating steady-state consumption and leisure paths conditional on the factor prices (wages and interest rates) implied by those conjectures, and iterating on updates of the aggregate variables until individual choices are consistent with all relevant market-clearing conditions. More-detailed discussions are contained in appendix 2 and in Altig and Carlstrom (1992).

IV. The Welfare Costs of Raising Revenue through Bracket Creep

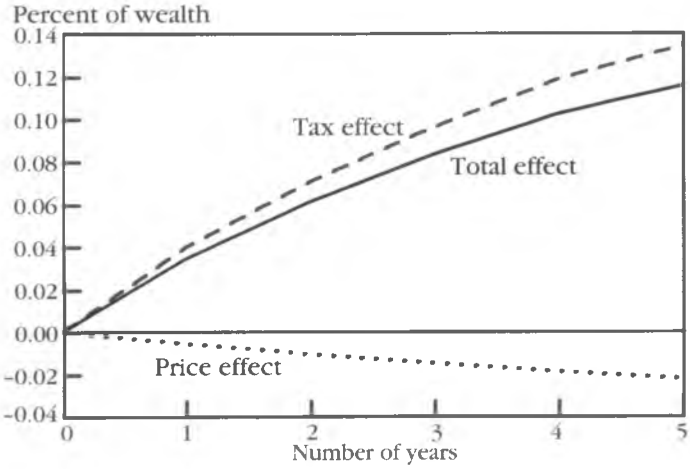
The policy in question involves temporarily forgoing indexation of the tax code. As discussed in section II, this is equivalent to raising the tax base by an amount equal to the rate of inflation prevailing over the period when inflation adjustments are suspended. In this section, we focus on the pure bracket-creep case, meaning that we abstract from problems associated with capital-income mismeasurement. Accordingly, for each age s individual, the new steady-state tax base obtained after repealing indexation for T periods is

9 We use the constant-cost net stock of fixed reproducible tangible wealth reported in the January 1992 *Survey of Current Business* as our measure of the U.S. capital stock. This measure includes consumer durables and government capital.

10 The Bureau of Labor Statistics' survey of payroll establishments implies that nonfarm employees worked an average of 36.5 hours per week over the 1959–92 period.

FIGURE 1

Welfare Losses from Suspending Indexation



NOTE: The model parameters are set to their benchmark values (see table 1).
SOURCE: Authors' calculations.

$$(6) \quad w_s \prod_{t=t'}^{t'+T-1} (1+\pi_t) + A_{s-1}(R-\bar{\pi})/(1+\bar{\pi}) - d_s,$$

where t' is the time at which inflation adjustments are repealed and $t'+T$ is the time at which they are reinstated. The term $\bar{\pi}$ represents the steady-state rate of inflation. Note that this definition of taxable income assumes that deductions are eventually adjusted for inflation and incorporates the assumption that inflation causes no further overstatement of real income once indexation commences.

Our experiments contrast the welfare effects of raising revenue through bracket creep, which we will refer to as the inflation-revenue regime, with an alternative strategy of directly increasing marginal tax rates, which we will refer to as the structural-revenue regime. All adjustments to the statutory rate structure involve proportionate increases in both τ^L and τ^H.[11]

Our welfare measure is the amount of wealth that must be given to a representative individual to compensate for utility losses resulting from raising revenue by suspending inflation indexation. Specifically, if we let $U_{\pi R}$ be the lifetime utility level of each member of a generation living in a steady state under the inflation-revenue regime, and U_{SR} be that of an individual under the structural-revenue regime, then welfare losses are measured as the share of full wealth that must be transferred to individuals in the inflation regime in order to equate $U_{\pi R}$ and U_{SR}.[12]

The solid line in figure 1 plots welfare losses under our benchmark parameterization for T equals 1–5 years, assuming an annual inflation rate of 2.7 percent.[13] Suspending indexation for one year would result in a loss equivalent to about 0.07 percent of wealth. This number grows, although at a decreasing rate, as the number of years over which indexation is suspended (and hence the cumulative rate of inflation) increases. Eliminating inflation adjustments for five years, which in our examples corresponds to price-level growth of about 14 percent, results in welfare losses of roughly 0.14 percent of wealth.[14]

The welfare losses indicated by our benchmark simulations indicate that the exploitation of bracket creep is a relatively inefficient method of taxation. The source of these losses can be more fully understood by examining the broken lines in figure 1. These experiments decompose welfare changes into a "tax effect" and a "price effect." The tax effect is the welfare loss due to changes in the marginal tax rate alone, absent any general-equilibrium price effect. That is, the tax effect is determined by setting prices r and ω at their steady-state levels from the structural-revenue regime, and by setting the age-specific marginal tax rates at the levels determined from the inflation-revenue regime. The welfare loss is the share of full wealth that must be transferred under these circumstances in order to maintain the utility level

■ 11 We have also attempted experiments in which only the top marginal tax rate is increased. Interestingly, "Laffer curve" effects render this alternative infeasible. That is, tax receipts begin to decrease as τ^H rises before revenues in the structural-revenue regime can be equated to those in the inflation-revenue regime.

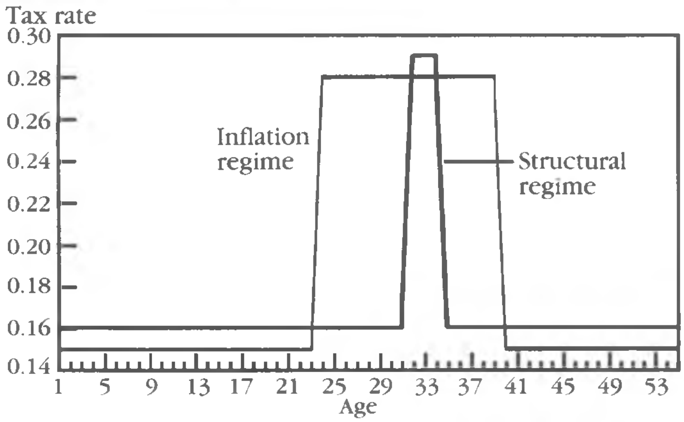
■ 12 Full wealth is defined as the present value of maximum labor income, that is, the amount of market wealth that could be generated if individuals allocated their entire time endowment to working. If welfare losses are negative, then the inflation-revenue regime generates higher utility than does the structural-revenue regime. In this case, the welfare measure would be the share of wealth that must be taken away in order to lower $U_{\pi R}$ to the appropriate level.

■ 13 This corresponds to the inflation rate assumed by the CBO in its most recent estimates of the revenue effects of suspending indexation. See CBO (1993).

■ 14 When indexation is suspended for five years, the equal-revenue structural alternative to the inflation-revenue regime implies marginal tax rates of 16.5 and 30.8 percent.

FIGURE 2

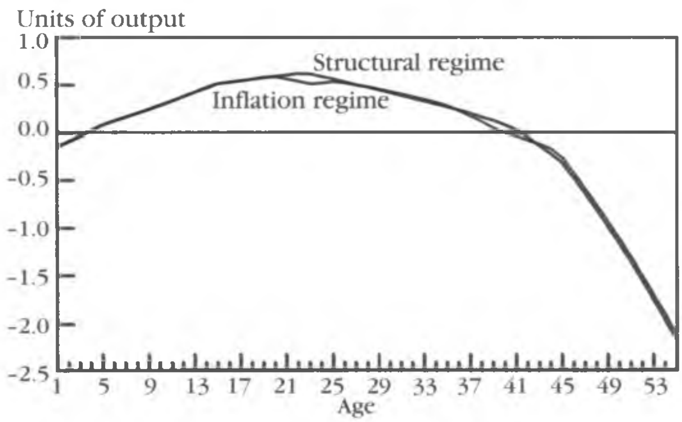
Life-Cycle Paths of Marginal Tax Rates



NOTE: The model parameters are set to their benchmark values (see table 1). Indexing is suspended for two years in the inflation regime.
SOURCE: Authors' calculations.

FIGURE 3

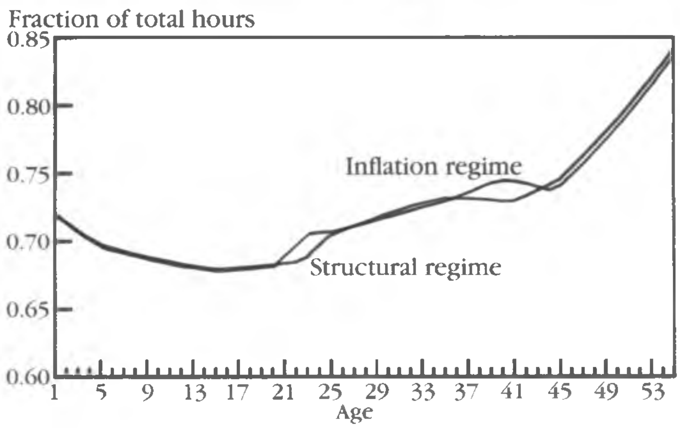
Life-Cycle Saving Profiles



NOTE: The model parameters are set to their benchmark values (see table 1). Indexing is suspended for two years in the inflation regime.
SOURCE: Authors' calculations.

FIGURE 4

Life-Cycle Leisure Profiles



NOTE: The model parameters are set to their benchmark values (see table 1). Indexing is suspended for two years in the inflation regime.
SOURCE: Authors' calculations.

$U_{\pi R}$.[15] Analogously, the price effect is then determined by setting taxes at their steady-state levels from the structural-revenue regime and by setting prices at the levels obtained in the inflation regime.[16]

These partial-equilibrium experiments clearly indicate that the welfare losses from suspending indexation are driven by the direct effects of taxation: The differences in interest rates and wages between the two regimes actually dampen the inefficiency of the inflation-revenue case relative to the structural-revenue case, which is apparent from the fact that price effects are negative.

The reasons for a strong tax effect are suggested by examining the life-cycle paths of marginal tax rates, which are shown in figure 2 for the case where indexation is suspended for two years. Although the rates are marginally higher in the structural-revenue regime over much of the life cycle, they are substantially higher in the inflation-revenue case at some critical ages, specifically, 23–30 and 37–40.[17]

These effects show up clearly in figures 3 and 4, which depict life-cycle saving and leisure profiles in steady states under the two tax regimes, again assuming that inflation adjustments are forgone for two years. In both cases, saving and work effort are depressed near the "kinks" in household budget constraints—the points at which taxable income equals $\bar{y}$—induced by jumps in marginal tax rates. Because the equilibrium outcomes are such that distortions are more severe in the inflation-revenue regime, welfare is lower relative to the structural-revenue case.

Table 2 reports results from various sensitivity experiments in which welfare losses are calculated under alternative settings for the model's parameters. Suspending indexation creates welfare losses relative to our structural alternatives in all cases considered. Although these alternatives are clearly not exhaustive, we conclude from this evidence that our basic finding is robust to plausible changes in the model's parameterization.

■ 15 Thus, for purposes of calculating the tax effect, the modified inflation-revenue regime involves solving for the consumption and leisure profiles given r_{SR}, ω_{SR}, and the marginal tax rates obtained from the regime's original steady-state solutions.

■ 16 Thus, for purposes of calculating the price effect, the modified inflation-revenue regime involves solving for the consumption and leisure profiles given $r_{\pi R}$, $\omega_{\pi R}$, and the marginal tax rates obtained from the general-equilibrium steady-state solutions for the structural-revenue case.

■ 17 Age here refers to a period of adult life. If we assume that adult economic activity begins at biological age 20, then ages 23–30 and 37–40 in the model correspond to biological ages 43–50 and 57–60.

TABLE 2

Welfare Losses under Alternative Parameterizations

	Indexing Suspended for Two Years	Indexing Suspended for Four Years
Benchmark	0.0611	0.1023
Utility weight of leisure		
$\alpha = 0.25$	0.0743	0.1126
$\alpha = 1.0$	0.0465	0.0811
Rate of time preference		
$\rho = 0$	0.0582	0.1001
$\rho = 0.04$	0.1021	0.1271
Elasticity of substitution in consumption		
$1/\sigma_c = 0.33$	0.0601	0.0988
$1/\sigma_c = 0.2$	0.0793	0.1282
Elasticity of substitution in leisure		
$1/\sigma_l = 0.14$	0.0468	0.0759
$1/\sigma_l = 0.33$	0.0719	0.1219
Capital share of output		
$\theta = 0.3$	0.0515	0.0850
$\theta = 0.45$	0.0690	0.1111
Capital depreciation rate		
$\delta = 0.07$	0.0623	0.1031
$\delta = 0.13$	0.0522	0.0857
Population growth rate		
$n = 0$	0.0665	0.1096
$n = 0.03$	0.0552	0.0924

SOURCE: Authors' calculations.

V. Welfare Costs with Capital-Income Mismeasurement

Implicitly, the experiments conducted in the previous section assume that taxable income is calculated as follows: First, an individual's *real* income is determined, then it is multiplied by the appropriate inflation adjustment to obtain nominal income. It is this measure of nominal income to which inflation adjustments are applied.

The actual procedure, of course, omits the first step: Nominal taxable income is obtained directly and then deflated according to the relevant inflation index in order to determine the appropriate tax liability. As noted in section I, while the difference in these two procedures is not critical for calculating real wage income, the second approach overstates real asset income by $\pi \cdot A/(1+\pi)$.

In table 3, we provide a comparison of the welfare losses with and without capital-income mismeasurement. Results are reported for several different parameterizations of the model and pertain to experiments in which indexation is suspended for one year. Not surprisingly, the added, but realistic, complication of capital-income mismeasurement serves only to reinforce the welfare losses associated with the bracket-creep strategy of taxation.

VI. Concluding Remarks

In its recent analysis of alternative deficit-reduction options, the CBO argues that increasing revenue by suspending indexation is inappropriate because it amounts to "unlegislated tax increases." However, because such a suspension is possible only by a vote of Congress and the signature of the President, it is unclear why taxes raised through this approach should be considered unlegislated. Although it is true that the additional amount of revenue obtained over the course of several years would be determined by the inflation outcomes associated with Federal Reserve policy, Congress has ample scope to express itself on the issue of an appropriate inflation trend.

We suggest a more straightforward objection: Raising revenue by temporarily suspending indexation is inefficient relative to the more direct approach of raising marginal tax rates. This inefficiency arises because distortions of private work effort and saving decisions associated with rising marginal tax rates are more severe when revenues are raised through bracket creep. The net result is that the utility of the average individual is higher in the long run if inflation indexation is maintained and if tax revenues are raised by permanently adjusting structural tax rates.

Of course, a multitude of additional factors are ignored in the type of highly stylized model we have employed here. For instance, there is no lifetime heterogeneity and therefore no distributional issues of which to speak. Despite this caveat—which, after all, applies to any model—our analysis suggests that the decision to abandon the bracket-creep tax strategy is a wise one. As the public debate on deficit reduction inevitably continues into the future, taxation through suspending inflation indexation is probably one option we should keep off the table.

TABLE 3

Welfare Losses from Capital-Income Mismeasurement

	Without Capital-Income Mismeasurement	With Capital-Income Mismeasurement
Benchmark	0.0343	0.0718
Utility weight of leisure		
$\alpha = 0.25$	0.0506	0.0776
$\alpha = 1.0$	0.0256	0.0655
Rate of time preference		
$\rho = 0$	0.0318	0.0639
$\rho = 0.04$	0.0624	0.0652
Elasticity of substitution in consumption		
$1/\sigma_c = 0.33$	0.0344	0.0774
$1/\sigma_c = 0.2$	0.0488	0.0793
Elasticity of substitution in leisure		
$1/\sigma_l = 0.14$	0.0277	0.0578
$1/\sigma_l = 0.33$	0.0396	0.0975
Capital share of output		
$\theta = 0.3$	0.0285	0.0684
$\theta = 0.45$	0.0438	0.0840
Capital depreciation rate		
$\delta = 0.07$	0.0378	0.0812
$\delta = 0.13$	0.0291	0.0678
Population growth rate		
$n = 0$	0.0373	0.0868
$n = 0.03$	0.0318	0.0550

NOTE: Simulations assume indexation is suspended for one year.
SOURCE: Authors' calculations.

Appendix 1–Calibration of the Tax Code

Because our simulation model is geared toward capturing the average effects of life-cycle behavior, we calibrate gross income so that the highest level of steady-state cohort income matches the highest median income in the data. Taking 1988 as the reference year, this value was $42,192, associated with families headed by individuals aged 45–54. This number was obtained from the *Current Population Reports* (series P-60, No. 166, published by the Bureau of the Census) and was converted to 1989 dollars according to the CPIU inflation rate from 1988 to 1989 (4.8 percent). This yields a value for high income in 1989 dollars of $44,217. The scale of incomes in the model is chosen so that the highest steady-state income generated with the chosen tax code and 4 percent inflation is equal to this value.

Taxable income levels are obtained by adjusting gross income levels for deductions and personal exemptions. In the benchmark case, we assume that all taxpayers take the 1989 standard deduction of $5,200. The personal exemption level in 1989 was $2,000. Multiplying by 3.13, the average family size in 1988, yields total personal exemptions of $6,260. Thus, our simulations assume that $d =$ $11,460 per household at every age.

Appendix 2–Outline of Solution Strategy

Given a marginal tax-rate structure that is a continuous function of taxable income, the model can be solved using the following algorithm:

(i) Conjecture values for K and L (and hence for r and ω).

(ii) Conjecture a sequence of marginal tax rates, τ_t, for $t = 1$–55.

(iii) Let u_{it}, $i = c,l$, denote the age t marginal utilities of consumption and leisure, respectively, and let λ_t denote the LaGrange multiplier associated with the time t budget constraint in equation (2). Given the conjectured net prices, use equation (2) and the first-order conditions

$$\text{(A1)} \quad u_{c,t} - \lambda_t = 0,$$

$$\text{(A2)} \quad u_{lt} - \lambda_t \varepsilon_t \omega_t (1 - \tau_t) = 0,$$

and

$$\text{(A3)} \quad -\lambda_{t-1} + \lambda_t \beta [1 + r(1 - \tau_t)] = 0$$

to solve for the optimal consumption and leisure plans for members of each generation.

(iv) Apply the implied path of wage and asset income to the tax code and update the path for marginal tax rates. Updates can be obtained using the Gauss–Seidel algorithm.

(v) Repeat steps (iii) and (iv) until the optimal paths of consumption and leisure are consistent with the marginal tax rates they imply.

(vi) Aggregate individual labor and asset supplies to obtain updates for K and L.

(vii) Repeat steps (ii) through (vi) until aggregate labor and asset supplies are consistent with individual consumption and leisure decisions.

Altig and Carlstrom (1992) demonstrate how a simple change-of-variables strategy can be used to apply this algorithm to the case where marginal tax rates are a step function of taxable income.

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