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BRACKET CREEP IN THE AGE OF INDEXING: HAVE WE SOLVED THE PROBLEM?

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Abstract

Indexation of the personal tax code for price-level changes represents one of the most significant elements of U.S. tax legislation in the 1980s. However, because the indexation provisions do not adjust personal tax-rate schedules contemporaneously, bracket indexation remains incomplete. This paper argues that, even ignoring the remaining problems associated with capital-income measurement, depreciation provisions, and so on, the potential distortionary costs of inflation/tax-system interactions remain high.

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I. Introduction

For most of the American experience with a federal income tax, the U.S. economy has operated under a nominally based tax system. The essential characteristic of a nominal tax system is the designation in dollar terms of rate brackets, exemption levels, and other items that figure into the definition of taxable income.

The past decade, however, has seen an important and historically unique development in the structure of the U.S. personal tax system. By the beginning of the 1980s, it was clear that distortions created by interactions between the tax system and the high inflation rates of the 1970s had exacted significant costs on the economy. The political recognition of this fact resulted in the introduction of limited indexation of the personal tax code by way of automatic inflation adjustments legislated in the Economic Recovery Tax Act of 1981 (ERTA), provisions that were maintained by the Tax Reform Act of 1986 (TRA86).[1]

The double-digit inflation rates of the years immediately preceding passage of ERTA were, by contemporary American standards, extraordinary, and by 1986 the inflation rate had fallen substantially. U.S. inflationary experience in the post-ERTA years has, in fact, differed markedly from the experience of the decade prior to enactment of this legislation. From 1971 through 1981, annual inflation rates averaged 6.3 percent as measured by the Bureau of Labor Statistics' Consumer Price Index for all urban wage earners (CPIU). The standard deviation of the

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inflation rate over this period was 3.52 percent. From 1982 through 1989, however, the inflation rate averaged 3.7 percent, with a standard deviation of only 1.09 percent. Although the oil shock of late 1990 has resulted in a significant departure from this pattern, most forecasts for 1991 suggest that the rate of inflation will return to a level more consistent with recent history.[2]

The coincidence of improvements on the inflation front and introduction of indexing into the tax code has significantly colored recent monetary policy debates. Conventional wisdom, as represented by the arguments typically presented to undergraduate students in economics courses, holds that the most significant costs of inflation are associated with inflation uncertainty and with tax distortions introduced by interactions between price-level growth and nominal tax systems.[3] Thus, even prior to the recent economic downturn, the combination of several years of modest, relatively stable inflation and indexing of the personal tax code had provided a powerful case for maintenance of the status quo with respect to current Federal Reserve policy, including the "inflation targets" implied by the Fed's stated goals for monetary-aggregate growth.[4] By extension, these factors have contributed to skepticism about the value of a zero-inflation target, especially among those who are convinced that achieving zero inflation would impose short-run costs by inhibiting economic activity.

Has indexation substantially mitigated the costs of inflation? Perhaps. But the arguments presented in this paper assert that, even ignoring issues such as nonindexation of

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capital income, nonindexation of the corporate tax code, and distortions created by the collection of seigniorage, the costs of anticipated inflation remain high.

In particular, because indexation of the tax code is not contemporaneous, the problem of "bracket creep," or the tendency of inflation to push taxpayers into higher rate brackets without concomitant increases in real income, has not been entirely eliminated by the indexing provisions in the current tax code. Thus, even when viewed in the most favorable light possible, the task of indexing the tax code is seen as far from complete. Introducing additional problems such as the nonindexation of capital income, which is considered in the penultimate section of this paper, simply reinforces the bracket-creep effects that still exist.

II. The Indexing Provisions of ERTA and TRA86

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 CPIU. ERTA defined the cost-of-living index as the average CPIU for the 12-month period ending September 30 of the year <u>prior to</u> the tax year, divided by the average CPIU for the analogous period in

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1984. Thus, because tax years and "index years" were not synchronized, ERTA mandated that inflation adjustments be made with an approximate lag of one year.[5]

To give a specific example, the cost-of-living index for 1986 was calculated by dividing the average CPIU for the period spanning October 1984 through September 1985 by the average CPIU for the period spanning October 1983 through September 1984. Tax-bracket limits and personal exemption levels for tax year 1986 were then adjusted by multiplying the statutory bracket limits and personal exemption levels in effect for the 1984 tax year by the resulting cost-of-living index.

Although the indexing provisions of ERTA were in effect for only two years before being superseded by TRA86, the new legislation extended the ERTA indexing scheme with only minor modifications. The first of these modifications arose because TRA86 eliminated the zero-bracket amount of taxable income.[6] To compensate, personal exemption levels, the standard deduction level, and the earned-income tax credit for low-income taxpayers were increased. In conjunction with these changes, TRA86 also extended inflation indexing to the standard deduction and the earned-income credit.

The second modification involved minor changes in the way the cost-of-living index is calculated. This index is now derived by dividing the average CPIU for the 12-month period ending August 31 of the year prior to the relevant tax year by the average CPIU for the corresponding period ending August 31, 1987.

The indexing provisions of TRA86 are currently in force.

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III. Bracket Creep and Lagged Indexation: A Pseudo-Historical Record

Figure 1 plots both the actual annual inflation rate between 1971 and 1989, as measured by the December over December change in the CPIU, and the annual "index inflation rate" that would have been applied to tax brackets had the indexing provisions of ERTA been in effect during this period. As suggested above, the time path of the index inflation rate looks very much like the time path of the actual inflation rate displaced by one year.

Discrepancies between the actual and index inflation rates depicted in figure 1 reflect the dual effects of inflation variability and the technical construction of the cost-of-living index. Because of variability in realized inflation rates, the pictured relationship between actual and index inflation rates is characterized by years in which overindexation has (or would have) occurred, as well as by years in which underindexation has (or would have) occurred. Thus, in some years adjustments to bracket limits exceed the actual rate of inflation, and in some years indexing adjustments fall short of actual inflation.

The technical issue arises because the inflation-rate adjustment is not strictly a one-year lag of the inflation rate, but, as explained in section II, a rate constructed using the average of the CPIU over the 12-month period ending 15 months (for ERTA) or 16 months (for TRA86) prior to the relevant tax year. Thus, although the annual year-end to year-end growth rate of the CPIU was essentially constant at 4.4 percent from 1987 through 1989, the ERTA index adjustments would have been 2.1 percent in 1987, 3.2 percent in 1988, and 4.1 percent in 1989.[7]

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What effect would bracket creep have had on the average taxpayer given the indexing history shown in figure 1? A back-of-the-envelope answer to this question is shown in figures 2 and 3, which depict hypothetical time series for the average marginal tax rate under three distinct rate-structure assumptions.[8] The chosen rate schedules include one from the pre-ERTA period (1971), one from the post-ERTA/pre-TRA86 period (1982), and one from the post-TRA86 period (1989).[9]

Figure 2 depicts simulated average marginal tax rates in the absence of indexation. Specifically, the hypothetical series in figure 2 were generated as answers to the following question: What effect would our actual inflationary experience from 1971 through 1989 have had on the average taxpayer's marginal tax rate assuming that (a) the average taxpayer is one of a family of four, claims slightly more than the standard deduction allowable in the 1971 tax code, and faces the statutory rate schedule for married persons filing jointly; (b) real income remained unchanged; (c) the particular tax-rate structure, the distribution of pre-tax personal income, and the ratio of taxable to nontaxable income remained unchanged;[10] and (d) perfect indexation (that is, indexation with no lag) was applied to the dollar amounts of personal exemption and deduction levels, but not to marginal tax-rate brackets? In addition, the series in figures 2 and 3 abstract from capital-income mismeasurement problems that arise due to the inappropriate calculation of real asset income under nominal tax systems. We discuss the capital-income mismeasurement issue in more detail in section V.

The average marginal tax rates depicted in figures 2 and 3

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were calculated as weighted averages of individual marginal tax rates. The weights for each bracket were constructed as the within-bracket share of adjusted gross income on all returns for married persons filing jointly in 1971. We obtained the necessary data from the 1971 Statistics of Income, published by the Internal Revenue Service. To provide a consistent basis for comparison, the dollar values of the bracket limits for the 1982 and 1989 rate schedules were converted to 1971 values using the CPIU.

The intercept, or benchmark, of each of the series shown in figure 2 reflects the zero-inflation average marginal tax rate. Of the three tax structures considered, the 1982 schedule has the highest rates and the 1989 schedule has the lowest rates. This ordering also reflects the sensitivity of each of the schedules to bracket creep. Relative to the zero-inflation benchmark, the cumulative effect of inflation/tax-system interactions increases the average marginal tax rates by 37.6 percent for the 1982 schedule, 31.2 percent for the 1971 schedule, and 25.2 percent for the 1989 schedule.

We do not suggest that these numbers reflect actual changes in average marginal tax rates from 1971 through 1989. The assumptions used in the calculations are clearly counterfactual, and the absence of indexation for exemption levels, deduction levels, and capital-income mismeasurement clearly results in an understatement of the effect of inflation on tax liabilities. On the other hand, ignoring factors such as the deductibility of nominal interest expense and periodic ad hoc indexation, such as the increased dollar values of rate brackets instituted by the

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Tax Reform Act of 1976, reduces the extent of this understatement.

Nonetheless, the series plotted in figure 2 do provide convenient reference points for rough calculations of the potential quantitative effects of the ERTA and TRA86 indexing schemes. Figure 3 depicts hypothetical paths for the 1971-1989 average marginal tax rates assuming that the ERTA indexing provisions had been in effect. Like the experiments depicted in figure 2, these hypothetical time series use historical realizations of inflation and are constructed for the 1971, 1982, and 1989 rate structures under the set of assumptions described above.

The results are fairly dramatic. Independent of the rate structure used, figure 3 shows that the inflation-induced drift in average marginal tax rates seen in figure 2 is substantially reduced when indexing is introduced in the manner provided by the current U.S. tax code. For example, using the 1989 rate structure, the cumulative effect of bracket creep increases the 1989 average marginal tax rate by just 1.3 percent relative to the zero-inflation benchmark.

An interesting feature of the series in figure 3 is that the calculated average marginal tax rates for 1986 are only slightly above the benchmark values for each of the rate structures considered. This result reflects the dramatic decline of annual inflation rates realized between 1981 and 1986. A pure one-year-lag indexation scheme effectively adjusts nominal taxable income in year t, relative to year t-1, by $(\pi_{t-1}-\pi_t)/(1+\pi_{t-1})$ percent.[11] It is clear from this expression that, with no real income

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growth, indexed taxable income will fall in periods of declining rates of inflation. It is this phenomenon that is reflected in figure 3's decreasing average marginal tax rates for the first half of the 1980s.

In fact, with the ERTA indexation scheme, the average marginal tax rate for 1986 fell to a level nearly consistent with zero inflation, even though the actual inflation rate for that year was not zero. This is surprising because, in the simplified world considered here, a pure one-year-lag indexation scheme will cause taxable income to be overstated by the current rate of inflation.

To provide a concrete example, suppose that a tax-rate schedule set at time zero is given by

Marginal Tax Rate	Tax Bracket
0	0 - Y
τ	> Y

Suppose further that the price level increases by $1+\pi$ in year 1 and every year thereafter. Then the sequence of marginal tax rates faced by an individual with a constant real income equal to Y is given by

Time	Nominal Income	Real Income	Nominal Tax-Bracket Limit	Marginal Tax Rate
0	Y	Y	Y	0
1	$Y\cdot(1+\pi)$	Y	Y	τ
2	$Y\cdot(1+\pi)^2$	Y	$Y\cdot(1+\pi)$	τ
3	$Y\cdot(1+\pi)^3$	Y	$Y\cdot(1+\pi)^2$	τ
.	.	.	.	.
.	.	.	.	.

Thus, taxable income is overstated by π percent every period.

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However, as indicated above, the actual inflation adjustment is not strictly based on a one-year lag of inflation, but on average inflation at lags of 15 months (for ERTA) and 16 months (for TRA86). By chance, the 1986 inflation rate implied by the ERTA indexing provisions exceeded the one implied by a strictly 12-month indexing lag. Consequently, by chance, the average marginal tax rate calculated for 1986 is only slightly above the value calculated for the zero-inflation benchmark.

IV. Has Tax Reform Eliminated Bracket Creep as an Economic Problem?

For the hypothetical taxpayer in the preceding example, sustained inflation permanently increases his or her marginal tax rate, even though nominal income brackets are eventually adjusted for price-level changes. More generally, in a steady state with lagged indexation and a constant inflation rate $\bar{\pi}$, taxpayers' taxable income will be overstated in every period by $\bar{\pi}$ percent. Thus, although the indexation scheme does not entirely eliminate the problem of bracket creep, it does bound the effects.

The obvious question is whether the residual effects of bracket creep are small enough to conclude that indexation has effectively eliminated the problem. This is of particular interest because the CPIU growth rate has rarely deviated by more than half a percentage point from 4 percent since 1982. The question can be usefully framed as follows: Given a steady-state inflation rate of 4 percent, have the indexing provisions of ERTA and TRA86 effectively eliminated distortionary costs associated with bracket creep? We claim that the answer is no.

In related research, we compared the long-run distortionary

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effects of revenues raised through bracket creep with the distortionary effects of raising the same amount of revenue through 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 structure and indexing scheme patterned after TRA86.[12]

The results of this research suggest that, even with the relatively favorable provisions of TRA86, raising revenue through bracket creep is less efficient than the hypothesized alternative of changing the structural tax rates. With a steady-state rate of inflation equal to 4 percent, the distortionary effect of bracket creep reduces simulated long-run annual output by about 1.2 percent relative to the case in which equal revenues are raised by a proportionate increase in the marginal tax-rate schedule. To put this number into perspective, 1.2 percent of real GNP in 1989 was $48 billion (in 1982 dollars).

Alternatively, relative to an equal-revenue tax regime with zero inflation, taxation based on the interaction of the tax code and a 4 percent annual steady-state inflation rate results in a welfare loss equivalent to a 0.1 percent reduction in total wealth per person. A 0.1 percent reduction would amount to approximately $1500 per person (in 1982 dollars; the corresponding figure in 1989 dollars would be approximately $1900).[13]

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V. Bracket Creep and Capital-Income Mismeasurement

Implicitly, the discussion thus far has proceeded as if taxable income is calculated in the following way: First, an individual's real income is determined. Second, this figure is multiplied by one plus the rate of inflation to obtain nominal income. Marginal tax rates are then determined on the basis of an index inflation rate being applied to this measure of nominal income.

The actual procedure, of course, omits the first step: Nominal taxable income is obtained directly and then deflated according to the index rate in order to determine the appropriate tax liability. Although the difference in these two procedures is not critical for the calculation of real wage income, real capital income cannot be obtained by simply deflating nominal capital income by $1+\pi$.

To provide an example of this capital-income mismeasurement problem, suppose that an individual has total nominal income given by $Y=W+R\cdot A$, where W is the total nominal wage payment and R is the nominal rate of return on asset holdings A. Contemporaneous bracket indexation would effectively deflate Y by $1+\pi$. But this is clearly inappropriate for measuring real capital income. Because real asset income is given by $(R-\pi)\cdot A/(1+\pi)$, simply dividing $R\cdot A$ by one plus the inflation rate would result in an overstatement of capital income equal to $\pi\cdot A/(1+\pi)$.

The 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

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regime, distortions from capital-income mismeasurement would remain. On the other hand, capital-income mismeasurement will generally contribute to overall bracket-creep effects. Accordingly, figure 4 depicts experiments analogous to those in figures 2 and 3, but includes capital-income mismeasurement.

Figure 4 traces out five distinct experiments based on the post-TRA86 tax code. Two of the pictured series simply replicate, for reference, the simulated average marginal tax rates for the 1989 tax code shown in figures 2 and 3. These series, represented by the broken lines in figure 4, abstract from capital-income mismeasurement.

The series represented by solid lines in figure 4 include the effects of capital-income mismeasurement. Three separate cases are considered: one with no indexing of any sort (the "no inflation adjustment" case), one with the indexing scheme specified by ERTA (the "lagged inflation adjustment" case), and one with nominal income deflated by the actual current inflation rate (the "current inflation adjustment" case).

The calculations in this section assume that taxable asset income is distributed uniformly over all taxpayers and is proportional to total taxable income. We obtained asset levels from both the 1963 and 1983 Survey of Consumer Finances, conducted by the Federal Reserve System (see Avery, Elliehausen, and Kennickell [1988]). Taxable assets are defined here as total assets exclusive of the value of owner-occupied real estate, state and local obligations, home mortgages, installment credit, and other debt.[14] For both the 1963 and 1983 surveys, the ratio of our taxable asset measure to personal income is 1.2.

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It is clear from our simulations in figure 4 that capital-income mismeasurement, while increasing the level of effective tax rates, does not substantially change the effects of bracket creep, with or without the type of indexation mandated by ERTA and TRA86.

It is interesting to note that the series of tax rates with capital-income mismeasurement and current inflation adjustment is quite similar to the series with lagged inflation adjustment and no capital-income mismeasurement, with the simulated rates in the former being sometimes higher and sometimes lower than the in latter. This feature also reflects the fact that our lagged inflation adjustment does not strictly correspond to a one-year lag of the actual inflation rate. If it did, the series with capital-income mismeasurement would always lie above the series that abstracts from capital-income mismeasurement.[15]

VI. Concluding Remarks

This discussion has focused primarily on the issue of bracket creep in the context of the indexing provisions in the current U.S. tax code. Our motivation for this emphasis is straightforward. Bracket indexation is the only element of recent tax reforms to address directly the potential distortions created by interaction of inflation and the tax code.

It is important to stress, however, that many potential sources of distortionary inflation/tax-system interactions remain. One particularly significant source of such interactions -- capital-income mismeasurement -- is briefly discussed in the previous section. For example, we note that Altig and Carlstrom

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(1991) use a variant of the simulation model described earlier to estimate back-of-the-envelope magnitudes of the economic costs arising through nonindexation of capital income. Representative numbers in that study suggest that with 4 percent annual steady-state inflation, distortions arising from the overstatement of capital income cause long-run annual output losses of between $2.80 and $4.50 for every dollar of revenue gained.

The message from these observations is clear. Although the indexing schemes introduced by ERTA and TRA86 represent progress, the issue of inflation/tax-system interactions is far from moot. Consequently, discussions about the costs and benefits of monetary policy goals, or, more specifically, the costs and benefits of particular inflation targets, must necessarily take these factors into consideration.

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Footnotes

1. An early review of the indexing provisions contained in ERTA can be found in Tatom (1985).

2. The consensus Blue Chip forecast for the fourth-quarter to fourth-quarter percentage change in the CPIU for 1991 was 4.0 percent as of January 1991. The DRI forecast for the same period was 3.4 percent, while the median forecast of the January Fourth Federal Reserve District Economists' Roundtable was 3.9 percent. We thank Michael Bryan for providing us with these numbers.

3. Familiar presentations of this position are found in Fischer (1981) and Fischer and Modigliani (1978).

4. The target range for M2 growth was 3 to 7 percent for both 1989 and 1990. According to Chairman Greenspan's July 1990 Humphrey-Hawkins testimony, the projected target range for 1991 is 2.5 to 6.5 percent.

5. An "index year" is referred to in ERTA as a "calendar year." This terminology is somewhat misleading in that ERTA's reference to a calendar year does not correspond to a 12-month period that spans January to December. Tax years, on the other hand, correspond to the usual January to December calendar year.

6. The zero-bracket income level was defined as the positive taxable income level below which the marginal tax rate was zero.

7. In addition to reflecting the effect of ending the index year in August of the previous year, these numbers include the impact of using an average 12-month CPIU to obtain the cost-of-living index. Using the one-year lag in August over August changes in the CPIU would yield annual index inflation rates of 1.8 percent for 1987, 4.2 percent for 1988, and 4.3 percent for 1989.

8. The analysis here focuses entirely on inflation-induced increases in effective marginal tax rates. It is of course true that the bracket-creep effects we consider will also raise average tax rates. For some problems, such as the indivisible labor problem studied by Hansen (1985), the average tax rate may be the more relevant variable. We are grateful to an anonymous referee for bringing this point to our attention.

9. The 1971 schedule had 24 rate brackets and a top marginal tax rate of 70 percent. The 1982 schedule had 12 brackets and a top marginal tax rate of 50 percent. Simplifying somewhat, TRA86 further reduced the number of tax brackets to four and the top marginal tax rate to 33 percent. The exact determination of marginal tax-rate brackets under TRA86 is complicated by the phaseout of personal exemptions at higher income levels. For simplicity, the post-TRA86 rate schedule assumed for the experiments depicted in figures 2 and 3 was

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derived from published rates for taxable incomes below $155,320 (Schedule Y-1 in the Instructions for Form 1040, Internal Revenue Service) and from the assumption of a 28 percent marginal tax rate for all income above $155,320.

10. The calculations assume that real, pre-tax income is uniformly distributed in each of the relevant adjusted gross income brackets.

11. Holding real income fixed, ignoring deductions and exemptions, and ignoring capital-income mismeasurement problems, nominal income grows by $1+\pi_t$. With a pure lagged-indexation scheme, income is deflated for tax purposes by the term $1+\pi_{t-1}$. Thus, the percentage change in indexed taxable income is obtained by solving for x from the expression $1+x=(1+\pi_t)/(1+\pi_{t-1})$.

12. Specifically, the analysis assumes a piecewise linear marginal tax-rate schedule with minimum and maximum rates of 15 and 28 percent. The numbers reported in this section update calculations originally reported in Altig and Carlstrom (1990).

13. An individual's full wealth is defined here as the present value of his or her maximum labor income. We estimate full wealth by assuming a maximum daily time endowment of 16 hours, an economic life span of 55 years, real wage growth of 2 percent per year, and an annual after-tax discount rate of 4 percent. We use the average weekly real wage for all production and nonsupervisory workers in 1989 to obtain a dollar figure for an individual's time endowment.

14. The subtraction of owner-occupied real estate and state and local debt obligations reflects the fact that most of the income from these assets is nontaxable. The subtraction of the last three categories reflects the deductibility of interest payments associated with home mortgages and other consumer debt. Although the interest on nonmortgage consumer debt was only partially deductible from 1987 to 1989, this category was small relative to total consumer debt (see Altig [1990]).

15. Real income at time t is given by $y_t=(W+(R-\pi_t)A)/(1+\pi_t)$, where, again, W is nominal wage payments and A is taxable assets. Recall from section III that an indexing scheme that adjusts nominal income with a lag of exactly one year overstates real income by π_t percent in year t. Because $A=1.2 \cdot y$, taxable income at time t under such an indexing scheme would be $y_t(1+\pi_t+1.2\pi_t)$. With lagged inflation adjustment and no capital-income mismeasurement, taxable income would be $y_t(1+\pi_t)$. With current inflation adjustment and capital-income mismeasurement, taxable income would be $y_t \cdot 1.2\pi_t$.

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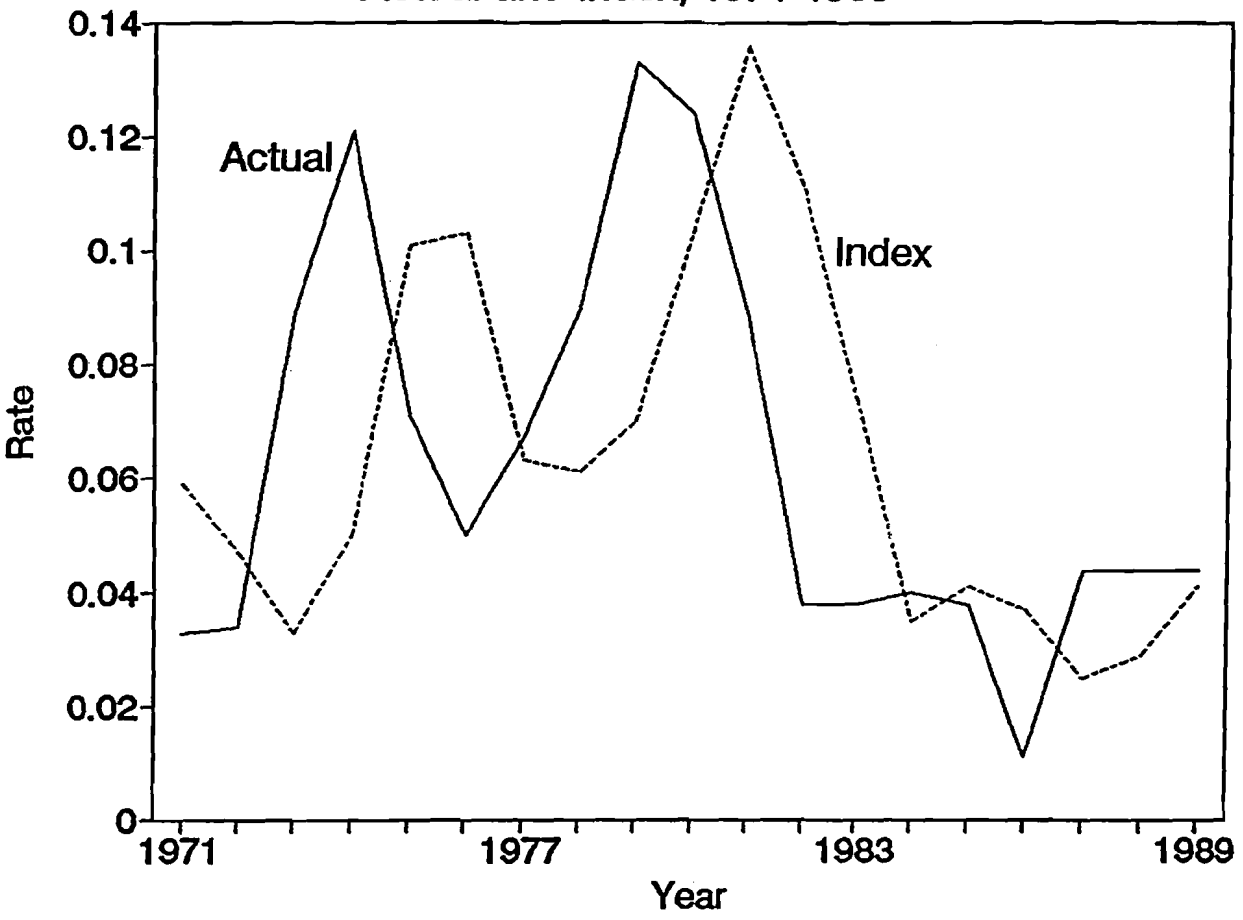
Figure 1: Inflation Rates
Actual and Index, 1971-1989



Source: Bureau of Labor Statistics.

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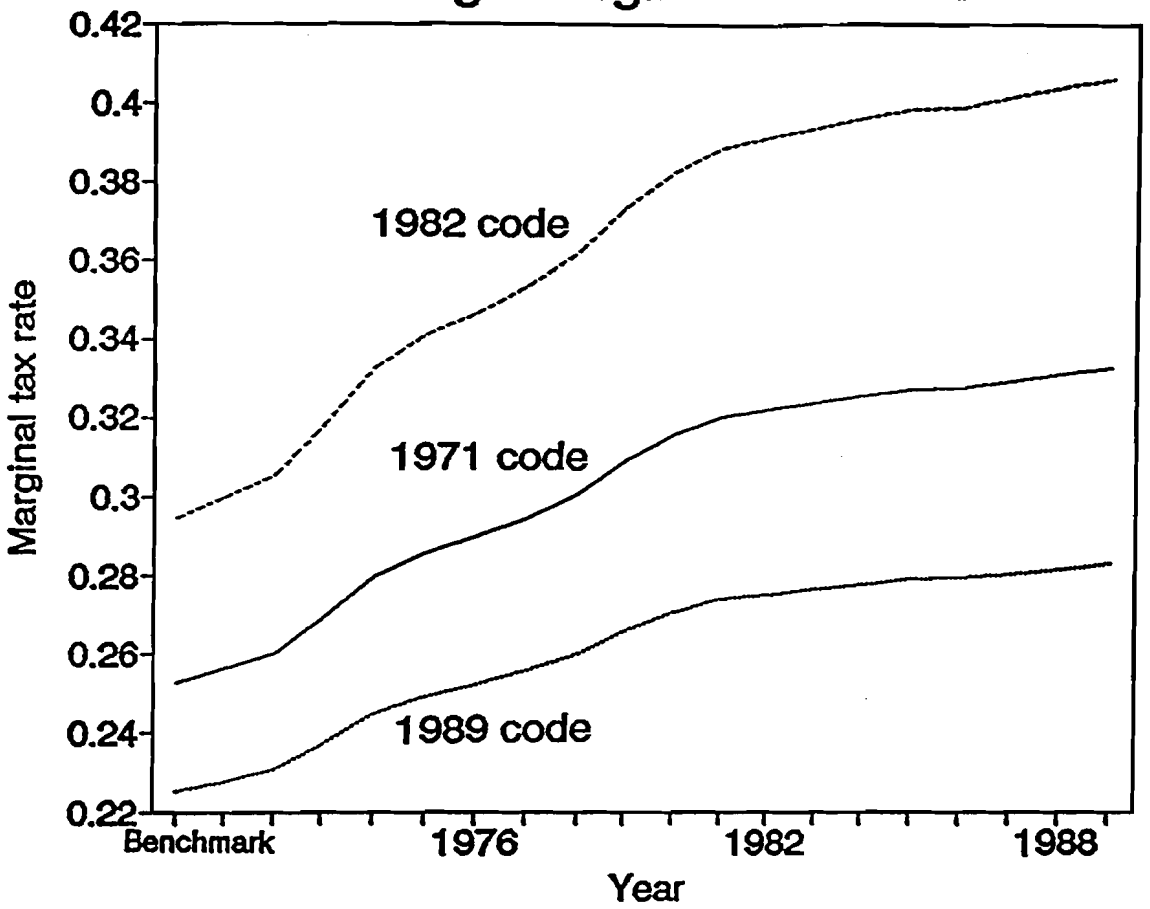
Figure 2: Effect of Bracket Creep on Average Marginal Tax Rates



Source: Authors' calculations.

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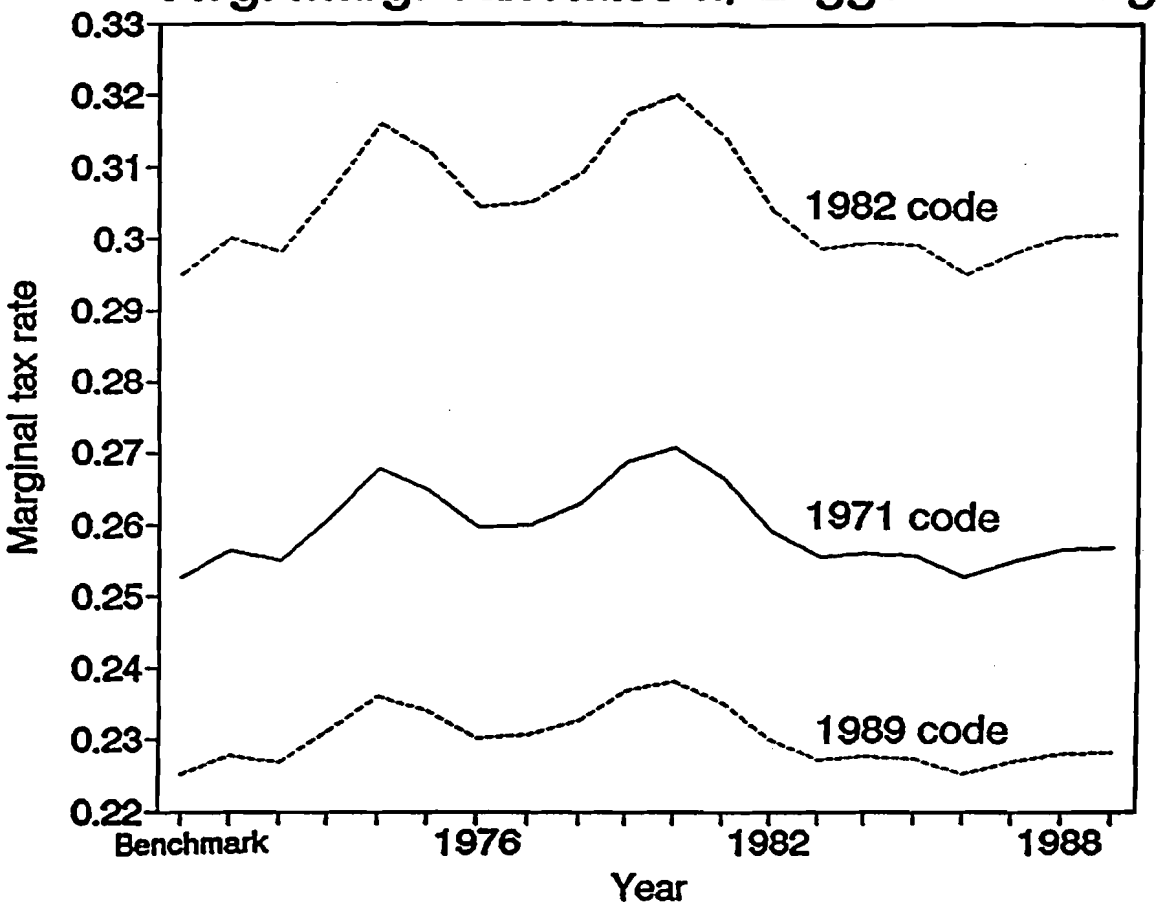
Figure 3: Effect of Bracket Creep on Avg. Marg. Tax Rates w/ Lagged Indexing



Source: Authors' calculations.

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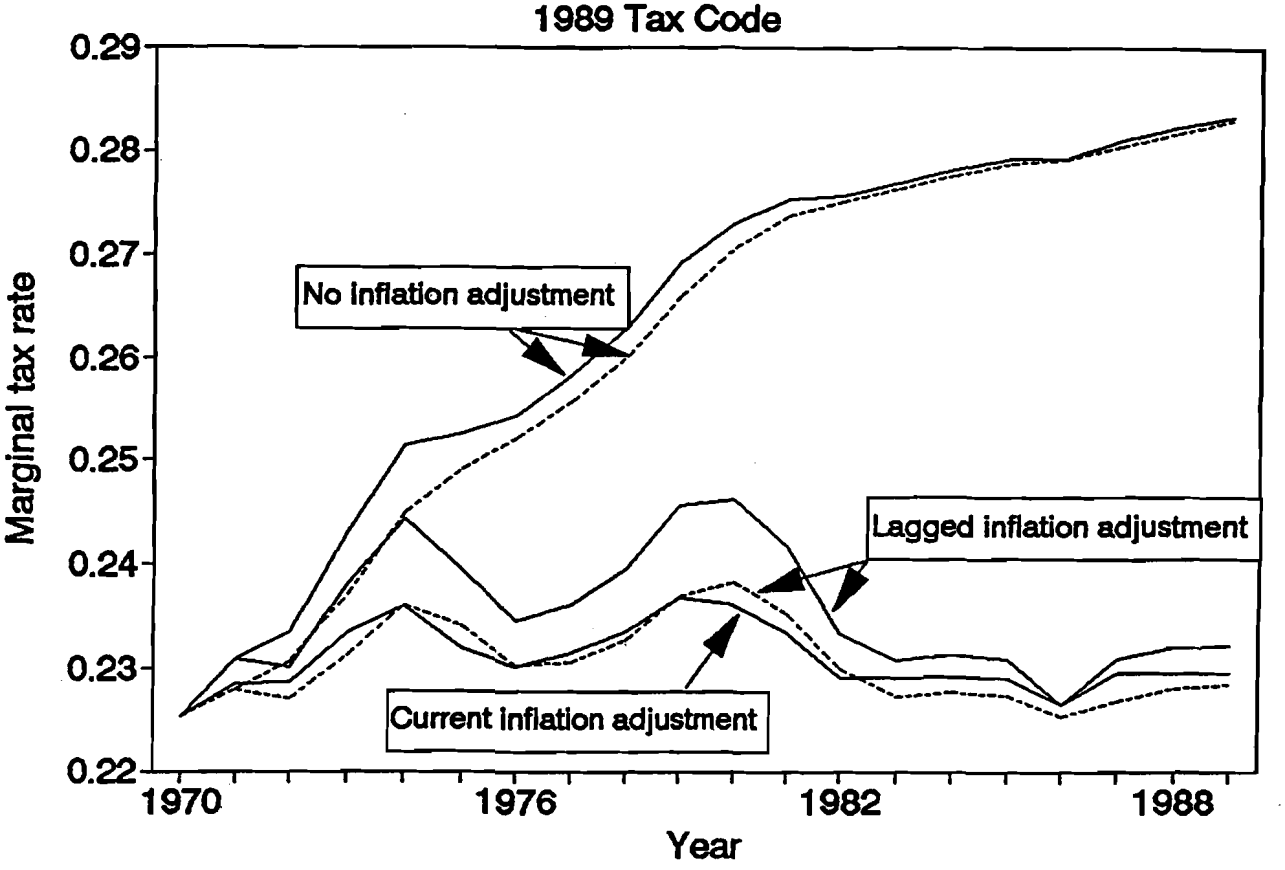
Figure 4: Indexing Schemes with and without Capital-Income Mismeasurement



Note: Solid lines represent cases with capital-income mismeasurement.
Source: Authors' calculations.

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