Indexing the Tax Code

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Indexing the Tax Code

REED SHULDINER*

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* Assistant Professor, University of Pennsylvania Law School. Portions of this Article were presented at a New York University School of Law conference in 1990, at a meeting of the Tax Structure and Simplification Committee of the Tax Section of the American Bar Association in 1991 and at a colloquium on capital gains sponsored by the Tax Law Review in 1993. Comments from participants on all three occasions have been helpful. I would also like to thank Leonard Burman, Thomas Evans, Cynthia Frank, Daniel Halperin, David Shakow and Alec Shuldiner for helpful comments on drafts of this Article. Finally, I would like to thank my research assistants, Todd Izzo and Joel Mick, for their assistance. All remaining errors are, of course, my own.
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**I. INTRODUCTION**

Inflation poses two conceptually distinct problems for an income tax system. First, inflation can cause the mismeasurement of a tax-

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1 In this Article, I ignore the possibility of deflation, a reasonable assumption given the United States' post-war experience. In general, deflation affects the tax system in the same
payer's income. For example, assume a taxpayer purchases an asset for $100, holds on to it for one year, and then sells it for $110. Under general tax rules, the taxpayer would be deemed to have $10 in income.\footnote{IRC § 1001(a).} Assume, however, all prices had increased by 10% during the year that the asset was held. The taxpayer would be no better off when she sold the asset for $110 than she was when she purchased it for $100. In real economic terms, she would have zero income. I use the term “indexing the tax base” to refer to correcting the measurement of income to account for such inflationary gains and losses properly. While conceptually straightforward, indexing the tax base is administratively complex and has not been dealt with adequately in the Code.

Second, even assuming that income is measured properly, inflation can change a taxpayer's real tax liability by affecting the structure of the tax system. In general, the structure of a tax system is susceptible to inflation whenever a taxpayer's liability is determined with reference to fixed dollar amounts. Thus, for example, if a personal exemption is fixed in terms of dollars, the value of the exemption declines with inflation. As discussed below, it is administratively uncomplicated to index the structure of a tax system for inflation and, for the most part, the federal income tax structure is indexed currently.

The next section of this Article discusses the effects of inflation on the structure of the federal income tax. In particular, Section II shows how inflation can distort a tax structure and how indexation can prevent such distortion. Section II also discusses the extent to which the income tax structure is currently indexed.

The remainder of the Article assumes a fully indexed tax structure and explores the extent to which inflation can cause mismeasurement of the tax base under an income tax. Section III begins by introducing the effect of inflation on the measurement of income, showing how inflation can affect the measurement of income in a wide variety of circumstances. Section III then explores the effect of inflation on the measurement of capital gains and ends with a comparison between indexation and a capital gains exclusion. Section IV extends the discussion of indexing capital gains by describing a variety of practical questions that arise in indexing capital assets including the timing of indexation adjustments and the appropriate indexation period.

Sections V through IX look at the need for indexation in measuring income other than capital gains. Sections V and VI conclude that it is generally unnecessary to index either wages or rents because both

\footnote{IRC § 1001(a).}
represent current payments properly measured in current dollars. Section VII looks at the need to index depreciable assets, considers accelerated depreciation as a substitute for indexation, and concludes that the former is an inferior substitute for the latter.

Section VIII deals with indexing inventories, showing the need for indexation and arguing that, just as accelerated depreciation is an inferior substitute for indexed depreciation, the LIFO inventory method is an inferior substitute for indexation.

Section IX introduces the question of indexing liabilities and concludes that, in many ways, debt instruments present the strongest case for indexation. In particular, it considers and rejects the argument that it is unnecessary to index debt because the market will compensate for the lack of indexation.

Section X discusses the merits of "partial indexation," the indexing of assets without the corresponding indexation of debt. Partial indexation is rejected both because of the arbitrage opportunities that it creates and because the case for indexing debt is stronger than the case for indexing assets. Section X also discusses "global indexation," indexing taxpayers based on their overall assets and liabilities without regard to individual transactions. Section XI is a brief concluding section.

II. INDEXING THE TAX STRUCTURE

A. The Need to Index the Tax Structure

It is important to understand that the structural problems caused by inflation are not due to the fact that inflation increases nominal taxes, but rather to the fact that inflation increases nominal taxes by more or less than the rate of inflation. In other words, problems arise when inflation increases or decreases real and not merely nominal tax burdens. Compare, for example, the effect of inflation on a sales tax with the effect on a per unit excise tax. Assume a city imposes a 5% tax on all sales and sales total $1 million. The city would collect $50,000 in taxes. If 10% inflation causes sales to increase to $1.1 million, the city would collect $55,000 in taxes. The 10% increase in tax collections would offset exactly the effects of inflation. In real or constant dollar terms, tax revenues would be unchanged. By contrast, consider the effect of a $1 per unit excise tax. Assume that prior to the inflation, the $1 million in sales is generated by the sale of 50,000 units at $20

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3 Imbedded in the example is the assumption that real sales will be unaffected by inflation. If inflation has a real, as well as a nominal, effect on sales, then real tax liabilities also would be expected to change as a result of inflation. Indexing the tax structure generally would not be expected to compensate for real, as opposed to nominal, changes.
per unit. The city would collect $50,000 from the excise tax. If 10% inflation increased the per unit price to $22 and sales volume were unchanged, the tax revenue would remain at $50,000. While the tax would have stayed constant in nominal dollars, it would have decreased in real dollars. If the city wished to maintain its excise tax revenues in real terms, it could adjust the excise tax each year to compensate for the effects of inflation. In the example, the city could maintain its real tax revenues by increasing the excise rate from $1 to $1.10 per unit, thereby raising its revenues from $50,000 to $55,000. The adjustment could be made by revising the tax law each year or it could be automatic. Such an automatic adjustment for inflation is referred to as “indexation.”

Similarly, an income tax may or may not be affected by inflation. Consider first a strictly proportional income tax. Assume that there is a 20% income tax and that in Year 1 a taxpayer has income of $40,000. The taxpayer would be liable for $8,000 in taxes. If, as part of a general 10% inflation, her income increased to $44,000 in Year 2, her tax liability would increase to $8,800. Recognizing that she is no better off with $44,000 in Year 2 dollars than she was with $40,000 in Year 1 dollars, one can argue that the increase in taxes is a real incremental burden. That argument is fallacious, however, because it fails to take into account her ability to pay the $8,800 Year 2 liability with less valuable Year 2 dollars. While her nominal tax has increased in proportion to her nominal income, her real tax has remained a constant proportion of her real income. Thus, in the case of a strictly proportional income tax, indexing is unnecessary. 4

Like a sales tax, the structure of an income tax becomes sensitive to inflation when it diverges from a strictly proportional tax. Thus, for example, when an income tax has features such as floors, ceilings, deductions, exemptions and brackets that are specified in fixed dollar amounts, the structure of the tax is sensitive to inflation. 5 For example, assume that a taxpayer is subject to a 20% income tax, but is permitted a $2,000 exemption. The exemption will always be worth $400 in nominal terms. 6 Thus, if there is 10% inflation, the real value

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4 The social security tax up to the maximum wage limit is an example of a strictly proportional income tax. See IRC § 3101 (imposing tax on employees); IRC § 3111 (imposing tax on employers); IRC § 3121(a) (defining the tax base to be limited by the contribution and benefit base under § 230 of the Social Security Act, 42 U.S.C. § 430 (1988)). If the wage limit were not indexed, however, real tax liabilities would diminish with inflation for wage earners whose inflated wages exceeded the cap. The wage limit is currently indexed. 42 U.S.C. § 430 (1988).

5 Structural elements of an income tax that are expressed as a percentage of income generally are not affected by inflation. See, e.g., IRC § 67 (floor on itemized deductions equal to 2% of adjusted gross income).

6 $400 = 20% * $2,000.
of the $400 reduction in tax will decline by approximately 10%.

The real value of the exemption can be maintained by indexing the exemption amount so that when prices rise by 10%, the exemption increases by 10% from $2,000 to $2,200 and the tax savings increases by 10% from $400 to $440.

In addition to reducing the real value of fixed deductions, inflation has the effect of reducing the size of tax brackets expressed in fixed dollar amounts. For example, consider an income tax of 10% on the first $10,000 of income and 20% on all income in excess of $10,000. Under such a structure, a taxpayer earning $40,000 would owe $7,000. If, however, as a result of 10% inflation, her income increased to $44,000, her tax liability would increase to $7,800. The increase from $7,000 to $7,800 represents a nominal increase of 11.4% and a real increase of 1.3%.

B. Current Indexation of the Code

The Code contains many significant features specified as fixed dollar amounts, including the rate brackets, the standard deduction (or zero bracket amount) and the personal exemptions. Prior to the indexation of the Code as part of the Economic Recovery Tax Act of 1981 (ERTA), the Joint Committee on Taxation estimated that a 10% inflation rate caused a 16% increase in tax revenues. ERTA indexed the rate brackets, the personal exemptions and the standard deduction. In addition to these principal structural features, Congress has indexed a variety of other Code provisions including, for example, the earned income credit, the threshold for the phaseout of

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7 An alternative way to view the problem is to look at the taxpayer's total liability. Assuming that there is a flat 20% tax rate, no deductions other than the $2,000 exemption, and the taxpayer's Year 1 income is $40,000, her Year 1 tax liability would be $7,600. If by Year 2 all prices had increased by 10%, her Year 2 liability would be $8,400, an increase of approximately 10.5%. Measured in Year 1 dollars, her tax liability would have increased from $7,600 to $7,636, an increase of approximately 0.5%.

8 $7,000 = (10% \times \$10,000) + (20% \times \$30,000)$.

9 $7,800 = (10% \times \$10,000) + (20% \times \$34,000)$.

10 The 1.3% real increase is computed by restating the $7,800 as $7,091 Year 1 dollars and calculating that $7,091 represents a 1.3% increase over $7,000.


itemized deductions, and, at least in part, the phaseout of personal exemptions. 14

The structural indexation enacted to date has not imposed a significant administrative burden on the tax system because the Service can perform the necessary computations and publish them along with the appropriate tax forms and publications. 15 For example, § 1(f) provides that Treasury must issue new tax tables by December 15 each year for the following tax year based on the change in the consumer price index through August 31 of the current tax year. Thus, as of the beginning of each calendar year, taxpayers are able to determine the tax rates they face for the upcoming year. Of course, because inflation is measured as of August 31 of the previous year, the changes to the tax rates always lag behind the actual level of prices.

Despite the relative ease of indexing the tax structure, there remain a large number of instances where it has not been indexed. 16 In some

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14 See IRC § 32(i) (indexation of earned income credit); IRC § 68(b)(2) (threshold for phaseout of itemized deductions); IRC § 151(d)(4)(B) (threshold for phaseout of personal exemptions). Section 151(d)(3)(B) provides that the personal exemption is phased out at a rate of 2% for every $2,500 of adjusted gross income over a threshold amount. While both the amount of the exemptions and the threshold are indexed, the $2,500 figure is not. All else equal, as inflation increases adjusted gross income, the amount of income over the threshold increases by the rate of inflation and, therefore, the percentage phaseout increases. For example, assume that a taxpayer has $10,000 in adjusted gross income in excess of the threshold. Under § 151(d)(3)(B), the taxpayer loses 8% of his personal exemptions. If all price levels double, the taxpayer has $20,000 in adjusted gross income over the threshold and loses 16% of his personal exemptions. Because the exemptions have doubled, the nominal cost to the taxpayer has increased by a factor of four and the real cost has doubled. The legislative history does not explain why the phaseout was only partially indexed.

Other sections that provide for indexation include § 29(b)(2) (indexing the determination of the nonconventional fuels credit (other than the credit for gas from a tight formation)), § 41(e)(5) (indexing certain amounts for purposes of determining the base period amount used to compute the research and development credit), § 135(b)(2)(B) (indexing the limit on adjusted gross income for purposes of determining the exclusion of income from savings bonds), § 280F(d)(7) (indexing the depreciation limits for luxury automobiles), § 402(g)(5) (indexing the limitation on certain elective contributions to pension plans), § 415(d) (indexing the limitation on annual benefits from a defined benefit plan), and § 513(h)(2)(C) (indexing definition of “low cost articles” for purposes of defining an unrelated trade or business).

15 See, e.g., Rev. Proc. 93-49, 1993-2 C.B. 581 (providing inflation adjustments for 1994). Taxpayers and others bear some administrative costs in responding to the annual indexation adjustments. For example, employers must reprogram their computers each year to provide for revised withholding schedules.

16 Other countries, such as Canada, Argentina and Australia, have adopted full, annual automatic inflationary adjustments. Vito Tanzi, Inflation and the Personal Income Tax: An International Perspective 27-28 (1980). Other countries, such as Sweden, have indexed the brackets, but not exemptions. Id. at 29. Yet another group of countries has automatic indexation, but with discretionary elements. These include France, Luxembourg, the Netherlands and Israel. Id. at 30-33. Finally, some countries, such as Chile and Iceland, index their tax systems, but not with reference to conventional price measures. Id. at 33-46. See also Vito Tanzi, Inflation and the Indexation of Personal Income Taxes in Theory
cases, the failure to index is of little consequence. For example, the $100 deductible on casualty losses has not been indexed, but has been made essentially irrelevant by virtue of a floor equal to 10% of adjusted gross income.\textsuperscript{17} Because the floor is stated as a percentage of income, there is no need to index it.

In other instances, the failure to index perhaps is more properly regarded as an intentional measure designed to phase out a particular benefit. For example, the Revenue Act of 1987 imposed limitations on home mortgage indebtedness of $1 million in the case of acquisition indebtedness and $100,000 in the case of home equity indebtedness.\textsuperscript{18} The effect of not indexing these provisions is to reduce by the rate of inflation the real amount of permissible home mortgage indebtedness taken into account each year. Thus, for example, when measured in 1987 dollars, the $1 million limit on acquisition indebtedness already has been reduced to approximately $750,000.\textsuperscript{19} Moreover, if inflation continues at a modest 4%, the limitation will be worth approximately $500,000 in 1987 dollars by the year 2000.\textsuperscript{20} In other words, the real limit on home mortgage indebtedness will have been cut in half by the year 2000 without any affirmative congressional action.\textsuperscript{21} A possible explanation for Congress’ failure to index the provision is that it is a way to achieve what otherwise might be politically infeasible, the gradual elimination of the home mortgage interest deduction.\textsuperscript{22}

Another example of a failure to index a substantive Code provision is the § 1211 $3,000 limitation on net capital losses, which dates back
to 1970. Measured in 1970 dollars, the limitation has decreased from $3,000 to approximately $775.\textsuperscript{23} If the $3,000 limitation had been indexed for inflation since 1970, it now would be approximately $11,600.\textsuperscript{24} Recent attempts to index the $3,000 limit have been unsuccessful.\textsuperscript{25}

In addition to the substantive provisions not indexed for inflation, there are a variety of nonsubstantive Code provisions that are based on fixed dollar amounts and not indexed. For example, many reporting provisions contain a de minimis rule.\textsuperscript{26} Similarly, penalty provisions often are based on fixed dollar amounts.\textsuperscript{27} It is hard to imagine why the scope of reporting obligations or the extent of penalties should increase merely because of inflation.\textsuperscript{28}

C. Is Structural Indexation a Good Idea?

Although, as discussed above, the structure of the Code, for the most part, already has been indexed for inflation, it is worth reviewing briefly the arguments for and against indexation. To begin with, it is important to note that the real question is not whether adjustments to the tax structure need to be made to compensate for inflation, but rather whether those adjustments should be discretionary or automatic. For example, Emil Sunley and Joseph Pechman compared ac-

\textsuperscript{23} Based on actual CPI through July 1993 and assumed 4% inflation for 1993-94. Census Abstract, note 19, at 479-81.

\textsuperscript{24} A partial list of other substantive Code provisions that have not been indexed include: § 21 (child care credit), § 22 (credit for the elderly and disabled), § 25 (mortgage credit), § 55 (alternative minimum tax computation including brackets and amount and phaseout of exemption), § 86 (floor on taxation of social security benefits), § 101(b) ($5,000 exclusion for employee death benefits), § 120 (exclusion for group legal service benefits), § 127 ($5,250 limit on exclusion for educational assistance programs), § 129 ($5,000 limit on dependent care assistance programs), and § 469(i) (exception from the passive loss rules for active participation in real estate activities).


\textsuperscript{26} Unindexed de minimis rules for reporting purposes include § 6041 (payments to independent contractors equal to or more than $600), § 6049 (interest payments aggregating $10 or more), and § 6050H (mortgage interest received of $600 or more).

\textsuperscript{27} Unindexed de minimis rules for penalty purposes include § 6657 (bad checks), § 6662(b)(3) (substantial valuation misstatement) and § 6662(b)(2) (substantial understatement penalty).

\textsuperscript{28} One might argue that it is reasonable to increase the scope of reporting obligations over time as taxpayers and others with reporting obligations become more familiar with the reporting requirements and, as a result, the real costs of complying with the requirements decline. The failure to index de minimis rules for reporting then could be seen as a way to increase the scope of the requirement over time, albeit in an unpredictable fashion.
tual individual income tax liabilities in 1975 with estimates of income tax liabilities under the 1960 Code, indexed to 1975 prices.\textsuperscript{29} They found that the aggregate tax liabilities under the actual 1975 Code were lower than the liabilities under the indexed 1960 Code. Thus, historically Congress has shown that it is able to respond to inflationary pressures on the income tax by a process of ad hoc tax reductions.

There are several arguments that have been posited for or against indexation.\textsuperscript{30} Commentators have argued that an unindexed tax structure is desirable because it acts as an automatic macroeconomic stabilizer. The argument is essentially that excess aggregate demand causes inflation, which in turn causes a real increase in taxes, which damps aggregate demand.\textsuperscript{31} There are at least two major weaknesses to the automatic stabilization argument. First, any stabilizing effect of inflation-induced real increases in income taxes may have a built-in lag that leads it to be ineffective or possibly counterproductive. Second, in periods of stagflation, inflation occurs simultaneously with inadequate aggregate demand. In such circumstances, an unindexed Code can act as a further destabilizing, rather than stabilizing, influence. Overall, it is likely that indexation of the tax structure has little effect on the overall stability of the U.S. economy.\textsuperscript{32}

The remaining arguments for and against indexation of the tax structure are essentially political.\textsuperscript{33} For example, both proponents and opponents of indexation have argued that in the absence of indexation, Congress would have fewer opportunities to revisit the tax law. It is unclear whether fewer opportunities would prevent Congress from making harmful changes to the tax law or would prevent beneficial change.\textsuperscript{34} In fact, the premise of the argument seems to be flawed. Since indexing the Code in 1981, Congress has made significant revisions in 1982, 1984, 1986, 1987, 1988, 1989, 1990, and 1993, as

\begin{itemize}
  \item[33] See Michael C. Durst, Inflation and the Tax Code: Guidelines for Policymaking, 73 Minn. L. Rev. 1217, 1289-95 (1989).
  \item[34] See, e.g., Henry J. Aaron, Inflation and the Income Tax: An Introduction, in Inflation and the Income Tax, note 29, at 1, 26.
\end{itemize}
well as having two major tax bills vetoed in 1992. Thus, indexing the Code apparently has not led to a decline in the frequency of significant amendments to the tax law. Another argument is that by requiring Congress to affirmatively lower tax rates to compensate for inflation, Congress has more flexibility to raise real taxes simply by failing to fully compensate for inflation. In effect, Congress simultaneously can lower nominal taxes and raise real taxes. It is interesting to speculate as to the extent that recent tax legislation would have differed if the Code had not been indexed and, as a result, the need for legislation to be revenue neutral was less of a constraint.

D. Choice of Index

There has been some debate over the appropriate price index to use for purposes of indexing the Code. If the purpose of indexing the Code is to make certain that an individual taxpayer whose income has risen only as much as consumer prices will be able to buy the same bundle of consumer goods with her after-tax income, the CPI is appropriate. An objection to its use, however, is that it fails to adequately account for increases in the prices of investment assets. Some critics thus argue for the use of a broader index, such as the implicit deflator for national income, on the grounds that the purpose of indexing the rate structure is to prevent a change in prices from affect-


36 There were a total of 114 public laws amending the Code during the 10 years prior to ERTA and only 75 during the 10 years following ERTA. 1 Internal Revenue Code 63-66 (CCH Aug. 1993) (listing public laws amending the Code). Thus, a raw count would appear to support the hypothesis that indexing led to a decline in tax legislation. These numbers, however, are unreliable because they do not distinguish between significant and insignificant changes in the tax law.

37 Eugene Steuerle has suggested that at least through the late 1970's and early 1980's, Congress tended to permit inflation to increase the real tax burden on the poor and those with dependents, while reducing real tax burdens on the wealthy. C. Eugene Steuerle, The Tax Decade: How Taxes Came to Dominate the Public Agenda 44-45 (1992) [hereinafter Tax Decade].

38 See CBO Budget Report, note 22 (describing the current budget rules that place constraints on revenue reducing changes in the tax laws).
ing the portion of the nation’s output collected as income taxes. In addition, any nationwide price index will fail to account for differences in changes in regional prices. Given, however, that the Code does not take regional price differences into account as an initial matter, there seems to be little justification to correct for changes in regional prices.

Regardless of the particular price index selected, it is important to note that indexing the tax structure in terms of a general price index does not compensate for increases in real income. Given a fully price-indexed progressive income tax, aggregate tax revenue will increase by more than the percentage increase in real income as real growth forces taxpayers into higher brackets. At least one country, Denmark, has chosen to index its tax structure on the basis of changes in average earnings of industrial workers, thus limiting the extent to which increases in real income will cause disproportionate increases in real taxes.

Overall, within reasonable bounds, the choice of index does not seem critical, especially in an era of frequent changes in the Code.

III. INDEXING CAPITAL GAINS

A. Introduction

The discussion of indexing the income tax structure in the previous section is based on the assumption that the tax base has been measured accurately. Even where the income tax structure has been completely indexed, however, inflation can cause serious problems in the measurement of the income tax base.

40 See generally David J. Shakow, Adjusting for Inflation in International Transactions (unpublished manuscript, on file with the Tax Law Review) (discussing significance of different regional inflation rates on measurement of income).
42 Depending on the details of implementation, inflation is less of a problem under a consumption tax than under an income tax. For example, if a consumption tax is implemented through a value-added tax, inflation will not be a problem because both the amount of each sale and the tax will be measured accurately in current dollars. Similarly, if a consumption tax is implemented as a cash-flow tax whereby expenditures for capital assets are immediately deductible and proceeds from the sale of capital assets are fully includible in the tax base, indexation generally would be unnecessary because there would be no need to use basis computations specified in historical dollars. Put differently, since basis always would be zero, indexation would have no effect. See generally David F. Bradford, Untangling the Income Tax S9-99 (1986) [hereinafter Untangling] (describing six alternative implementations of a consumption tax).
The most familiar instance of inflation induced mismeasurement of income is with capital gains. Consider, for example, T who purchases an asset for $1,000 in 1990, holds onto the asset for 10 years and then sells the asset for $1,500 in the year 2000. Under conventional methods of income measurement, T has taxable income (a capital gain) of $500. In fact, without knowing the amount of intervening inflation, it is impossible to determine whether, in a real sense, T is better or worse off for having owned the asset. In other words, whether T's command over goods and services, her ability to pay, has increased or decreased since she first purchased the asset is unknown. If, for instance, there has been a total of 80% inflation over the 10-year period, T would need approximately $1,800 in 2000 to purchase the same bundle of goods and services that she was able to purchase with $1,000 in 1990. Therefore, in a real sense, T has a loss of $300, rather than a gain of $500. Fundamentally, the mismeasurement of income is caused by the fact that gain or loss, which is computed in current dollars, is determined by reference to basis stated in terms of historical dollars. Although the problem may be somewhat harder to see, a similar mismeasurement of income is caused any time that a historical basis figure is used to compute current income. Thus, for example, absent indexing or a similar adjustment, net income derived from ownership of depreciable property or from the sale of inventory is also mismeasured.

Similarly, inflation will cause the mismeasurement of (negative) income from liabilities. For example, assume that T borrows $1,000, promising to repay $1,100 in one year. Under conventional income

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43 I use the term "capital gains" to refer to gains and losses from the sale or other disposition of an asset. I do not necessarily mean to refer to the technical Code definition of a "capital gain." See IRC § 1221 (defining "capital asset"); IRC § 1222 (defining "capital gain").

44 Ability to pay usually is seen as the appropriate basis for imposing an income tax. See, e.g., Michael J. Graetz, Federal Income Taxation: Principles and Policies 17 (2d ed. 1988) ("Tax equity requires that persons with equal ability to pay taxes should pay equal amounts of tax and that persons with greater ability to pay should pay more tax."); Adam Smith, An Inquiry into the Nature and Causes of the Wealth of Nations bk. 5, ch. 2, pt. 2, at 777 (Edwin Cannan ed., 5th ed., Modern Library 1937) (1789) ("the subjects of every state ought to contribute towards the support of the government, as nearly as possible, in proportion to their respective abilities").

45 Inflation of 80% over 10 years is equivalent to an annual inflation rate of approximately 6%.

46 A $300 loss is equal to the $1,500 amount realized minus her cost of $1,800 measured in current dollars. Both the gain and loss are stated in terms of Year 2000 dollars, which is appropriate given that her tax liability is measured and paid in Year 2000 dollars. See Section V.

47 See Sections VII (discussing the indexation of depreciation) and VIII (discussing the indexation of inventory).

48 See Section IX (discussing the indexation of debt).
accounting, $1,000 of the repayment would be denominated as principal and have no tax consequences and the remaining $100 of the repayment would be denominated as interest and potentially would be deductible.\(^{49}\) Economically, however, the amount of real principal T repays would depend on the level of inflation. If, during the intervening year, there had been 6% inflation, in real terms she would owe principal of $1,006 and, therefore, would be paying only $4 in interest. Thus, inflation would have caused her to overstate her interest by 125%.

B. Specific Issues in Indexing Capital Gains

As discussed above, one of the primary areas where inflation causes the mismeasurement of income is capital gains.\(^ {50}\) The error in measurement arises out of the fact that to determine income from the disposition of a capital asset, it is necessary to compare dollars from two distinct periods of time. In particular, gain (or loss) is defined as the difference between the amount realized from the sale or other disposition of an asset and the taxpayer's basis in the asset.\(^ {51}\) Since the taxpayer's basis generally represents the taxpayer's historical investment in the asset, it is measured in historical dollars, while the amount realized, measured by a current receipt, is measured in current dollars. The resulting computation with historical and current dollars is inaccurate. The simplest solution is to index the taxpayer's basis, thus converting the historical basis of the asset into current dollars that can be compared meaningfully with the proceeds from the sale of the asset to compute gain or loss.\(^ {52}\)

Some commentators have suggested that indexing basis provides an inadequate correction for inflation because inflation affects the mar-

\(^{49}\) IRC §§ 1272, 163(e). Under current law, there are many independent restrictions on deductibility of the interest. See, e.g., IRC § 163.

\(^{50}\) Generally, the effects of inflation and deflation are symmetric. See note 1. Due to the peculiarities of the Code, however, it is not always the case that increases and decreases in prices have symmetric effects. For example, the capital loss limitation generally causes inflation-induced capital gains to be treated differently from deflation-induced capital losses. Assume that when there is 10% inflation, T purchases an asset for $100,000 and sells the asset one year later for $110,000. T has no real gain or loss, but is taxable on a nominal gain of $10,000. On the other hand, if there is 10% deflation and the taxpayer sells the same asset for $90,000, the taxpayer may not be permitted to use some or all of the $10,000 nominal loss because of the capital loss limitation. IRC § 1211 (permitting capital losses for individuals only to the extent of $3,000 plus any recognized capital gains).

\(^{51}\) IRC § 1001 (determining the amount of taxable gain or loss).

\(^{52}\) As an alternative, it is possible to restate the amount realized in historical dollars, rather than restating the basis in current dollars. By doing so, however, the resulting gain also is stated in more valuable historical dollars. Because the tax liability is to be determined in current dollars, it then would be necessary to restate the gain in current dollars, ending up in exactly the same place.
ket value of an asset, not its basis. Thus, for example, the New York State Bar Association Tax Section has argued:

[I]n most cases actual basis adjustments will match inflationary increases only by happenstance. This unfortunate result occurs because in the absence of gain realization, annual adjustments are made to the basis of the asset without regard to its fair market value. Nevertheless, inflation in any period by its nature will increase the nominal price of an asset relative to its value at the beginning of the measurement period. 53

Assuming that the goal of indexation is to make a taxpayer's real tax liability invariant to inflation, this view is incorrect because it fails to take into account the fact that the tax is paid with inflated dollars. Consider a simple example. Assume that $T$ has a zero basis in an asset worth $1,000. If $T$ were to sell the asset today, she would have a gain of $1,000 and, assuming a 30% tax rate, would pay tax of $300. Assume that $T$ holds onto the asset and that all prices double. In that case, the asset would be worth $2,000. Because her basis is zero, if $T$ then sold the asset, she would have gain of $2,000 and pay tax of $600 without regard to indexation. While $T$'s nominal tax liability has increased from $300 to $600, her real tax liability remains unchanged. If, on the other hand, she only was required to pay $300 in tax despite the doubling of all prices, her nominal liability would have stayed constant, but her real liability would have been cut in half. 54

It is important to realize that the effect of inflation on the measurement of capital gains income is significant even at moderate levels of inflation. For example, over the decade from 1982 through 1991, total inflation was approximately 50%, or 4.1% per year, relatively moderate when compared to the previous decade. 55 Yet, consider the effect of this moderate level of inflation on the amount of gain. Assume that $T$ purchased an asset for $1,000 in 1981 and held the asset for 10 years. Table 1 shows the sales price of the asset, the nominal gain and the inflation adjusted real gain for the asset under three different scenarios: a 2% annual real decline in value, zero real growth, and a 4% annual real growth rate. In all three scenarios, the failure to index for

54 The argument that basis, not amount realized, should be indexed is the same as the argument for not indexing wages. See Section V (arguing that generally wages do not require indexation for tax purposes).
55 Census Abstract, note 19, at 479-81. Inflation over the decade from 1972 to 1981 was 124% or approximately 8.4% per year. Id.
even moderate inflation leads to a nominal gain that significantly overstates the real economic gain (or loss).

### Table 1
Real and nominal gain over 10-year period
4.1% annual inflation

<table>
<thead>
<tr>
<th>Real Growth</th>
<th>Zero Real Growth</th>
<th>4% Real Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Price</td>
<td>$1,221</td>
<td>$1,495</td>
</tr>
<tr>
<td>Nominal Gain</td>
<td>221</td>
<td>495</td>
</tr>
<tr>
<td>Real Gain (Loss)</td>
<td>(273)</td>
<td>0</td>
</tr>
<tr>
<td>Real Tax Rate</td>
<td>(24%)</td>
<td>∞</td>
</tr>
</tbody>
</table>

One way to measure the extent of the overstatement of gain is to compute the real tax rate, the ratio of the statutory tax liability to the real gain (or loss), and to compare the real tax rate to the statutory rate. The last row in Table 1 shows the real tax rate assuming a statutory rate of 30% applied to the nominal gain under each scenario. Under the 4% real growth scenario, the tax rate increases from a 30% statutory rate to a real tax rate of approximately 51%; under the zero growth scenario, the real tax rate is infinite; and under the negative growth scenario, the real tax rate becomes negative.

1. **The Relationship Between Indexing and Holding Period**

Since inflation compounds over time, it is natural to conclude that inflation causes a greater problem the longer the holding period of the asset. In fact, with respect to assets that have real gains, inflation is in certain ways a greater problem the shorter the holding period. It is, of course, true that the size of the inflation adjustment increases with the cumulative amount of inflation and, therefore, generally with time. The significance of the inflation adjustment, however, declines with time in two ways. First, assuming a constant inflation rate and a

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56 By comparing the statutory tax rate to the real tax rate as of the date of the sale, I am ignoring the effect of deferral. See notes 65–69 and accompanying text for a discussion of the interaction of deferral and inflation.

57 If the real growth rate is sufficiently negative so as to cause a nominal as well as a real loss, the real tax rate becomes positive, but remains less than the statutory rate. Given that the taxpayer is deducting a loss, the taxpayer wishes the rate to be as high as possible. In the example in Table 1, if the real growth rate is less than approximately negative 3.9%, the effective tax rate is positive. See note 75 (discussing distribution of returns on assets across income classes).

58 The reverse is true with real losses; see Section III.B.2.
constant real growth rate, the correction for inflation as a percentage of nominal gains decreases rather than increases with time.\(^{59}\) Second, because gain generally is not taxed until realization, a longer holding period offers the advantage of deferral, which can offset the overtaxation due to inflation.\(^{60}\)

It is easiest to demonstrate that the correction for inflation decreases over time with a numerical example.

**Example 1:** David purchases an asset for $1,000. The asset has real annual growth of 5% and inflation is 5%. At the end of the first year, the asset is worth $1,102 and has an indexed basis of $1,050.\(^{61}\) At the end of 20 years, the asset is worth $7,040 and has an indexed basis of $2,653.\(^{62}\)

If the asset is sold after one year, the nominal gain on the asset is $102 of which $50, or approximately one-half, is properly excluded. If the asset is sold after 20 years, the nominal gain is $6,040, of which $1,653, or approximately one-quarter, is properly excluded.\(^{63}\) The fact that the fraction of gain that should be excluded decreases over time is one argument against using a capital gains exclusion in lieu of indexing.\(^{64}\)

The second reason that indexation of capital gains becomes less important the longer the holding period is that while inflation causes the overtaxation of capital gains, deferral causes the undertaxation of such gains. By "deferral," I refer to the fact that under the realization doctrine, gains and losses on capital assets generally are not taxed on a

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\(^{59}\) In the case of real losses, however, the significance of the correction for inflation increases with time. See Section III.B.2.

\(^{60}\) In the case of real losses, however, deferral accentuates the problem of inflation and losses. See text following note 74.

\(^{61}\) $1,102 = 1,000 \times 1.05 \times 1.05$. $1,050 = 1,000 \times 1.05$. Cf. Oil & Gas Futures, Inc. v. Andrus, 610 F.2d 287, 287 (5th Cir. 1980) (holding, as a matter of law, that 0.82 is equivalent to 82%).

\(^{62}\) $7,040 = 1,000 \times 1.05^{20} \times 1.05^{20}$. $2,653 = 1,000 \times 1.05^{20}$.

\(^{63}\) For a mathematical proof that the correction for inflation declines with time when the asset has real growth, see Roger E. Brinner, Inflation and the Definition of Taxable Personal Income, in Inflation and the Income Tax, note 29, at 121, 126-27. Essentially, the inflation adjustment declines because while the inflation adjustment to basis compounds at the rate of inflation ($\pi$), the amount realized (that is, the nominal fair market value) compounds at the higher nominal growth rate ($\pi + r + r \pi$, where $r$ is the real growth rate). Over time, the higher compounding rate of the amount realized far outstrips the compounding of the basis ($\pi + r + r \pi > \pi$). Where an asset has nominal gains, but real losses ($r < 0$, $\pi + r + r \pi > 0$), the amount realized compounds more slowly than the basis ($\pi + r + r \pi < \pi$) and the inflation correction becomes more significant over time. When an asset has both nominal and real losses ($\pi + r + r \pi < 0$), the nominal loss is limited to the original nominal investment, while the inflation adjusted loss continues to increase each year, again causing the inflation correction to become more significant over time. See Section III.B.2.

\(^{64}\) For a discussion of the capital gains exclusion in lieu of indexing, see Section III.B.5.
current basis, but rather only upon disposition.\textsuperscript{65} The ability to defer
the payment of tax on gains has the effect of lowering the burden of
the tax. The longer the holding period, the greater the extent to which
deferral compensates for the failure to index for inflation.

To understand the interrelationship between deferral and indexation,
it is useful to define the effective tax rate by reference to the
relationship between the pretax and after-tax yields.\textsuperscript{66} Thus, for ex-
ample, if the pretax yield on an investment is 10\% and the after-tax
yield is 6\%, then the effective tax rate would be 40\%.\textsuperscript{67} The effective
tax rate can be measured in nominal or real terms, depending on
whether the yields are measured in nominal or real terms,
respectively.

Table 2 shows how the effective tax rate on an investment in a capital
asset depends on the length of the holding period.\textsuperscript{68} The example
in Table 2 assumes 5\% inflation, a single purchase of an asset that has
a pretax real yield of 5\% per year and a statutory tax rate of 30\%.

\begin{table}[h]
\centering
\caption{Effect of deferral on effective tax rates
(5\% real growth; 5\% inflation; 30\% statutory tax rate)}
\begin{tabular}{lccc}
\hline
\textbf{Years Held} & \textbf{Without Indexation} & \textbf{With Indexation} \\
 & \textbf{(A)} & \textbf{(B)} & \textbf{(C)} \\
\hline
1 & 30\% & 59\% & 30\% \\
2 & 29\% & 57\% & 29\% \\
3 & 28\% & 55\% & 29\% \\
4 & 27\% & 53\% & 28\% \\
5 & 26\% & 51\% & 28\% \\
10 & 22\% & 43\% & 26\% \\
15 & 19\% & 36\% & 24\% \\
20 & 16\% & 31\% & 22\% \\
25 & 14\% & 27\% & 20\% \\
30 & 12\% & 23\% & 18\% \\
35 & 10\% & 20\% & 17\% \\
\hline
\end{tabular}
\end{table}

\textsuperscript{65} IRC § 1001 (providing rules for determining gain and loss on disposition of assets).
\textsuperscript{66} In particular, I define the "effective tax rate" as one minus the ratio of the after-tax
yield over the pretax yield.
\textsuperscript{67} 40\% = 1 - (6\%/10\%).
\textsuperscript{68} The effective tax rates also can be shown in equation form. See Appendix I.
An effective tax rate of less than 30% indicates a net benefit and an effective tax rate in excess of 30% indicates a net detriment from the combination of inflation and deferral. Consider first Column A, labeled “Nominal Rate.” The numbers in Column A show the nominal effective tax rate without indexation, given the specified holding period. For example, if the asset is held for 15 years, the nominal effective rate is reduced to 19% (62% of the statutory rate) due to deferral. As can be seen from the table, the nominal effective rate is never greater than the statutory rate and the longer the period of deferral, the lower the nominal effective rate.

Column B, labeled “Real Rate,” shows the real effective tax rate without indexation and demonstrates the problem with examining only nominal effective tax rates. While the real effective tax rate declines with the holding period due to deferral, it is also consistently higher than the nominal effective tax rate because of inflation-induced mismeasurement of gain. For example, with the same 15-year holding period for which the nominal effective tax rate is 19% (62% of the statutory rate), the real effective tax rate is 36% (121% of the statutory rate). The real effective tax rate either can be greater than or less than the statutory tax rate, depending on whether the inflation factor or the deferral factor dominates.

Finally, consider the effect of indexation shown in Column C. With indexation, the effective tax rate is always less than or equal to the statutory tax rate because the overstatement of income due to inflation has been fully corrected while the benefit of deferral continues. As can be seen from Table 2, while indexation always lowers the effective tax rate (Column C) relative to the real effective tax rate without indexation (Column B), the gap between the two rates closes as the holding period increases. The declining difference is another reflection of the fact that the significance of indexation declines with the holding period.

In summary, it is important to keep in mind that there are two independent factors at work. First, inflation causes the amount of gain to be exaggerated, thus increasing the effective tax rate; and second, the opportunity for deferral lowers the effective rate. There are several implications that flow from this analysis. First, where there is no significant deferral, inflation is a much more serious problem than where there is significant deferral. For example, where the holding

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69 Another way to view the difference between indexing and not indexing is to look at the ratio of the effective real tax rate without indexing to the effective real tax rate with indexing. With a one-year holding period, the ratio is approximately 2:1. In other words, the effective tax rate is approximately doubled by the failure to index. With a 15-year holding period, the ratio drops to approximately 1.5:1; the effective tax rate is increased by approximately 50% by the failure to index.
period is one year, the real effective tax rate in the above example is approximately 60%, twice the statutory rate. By contrast, where the holding period is 20 years, the effective tax rate is approximately 30%, equal to the statutory rate. Thus, to some extent, the desirability of indexing depends on the length of the holding period. For brief holding periods, indexing can be critical to prevent excessive tax rates. For long holding periods, the failure to index may merely offset the benefit of deferral. In fact, it is arguable that for long holding periods, it is inappropriate to index given the value of deferral.

Second, accrual or mark-to-market taxation often is recommended as the appropriate method for taxing income from capital assets because it solves the problem of deferral. As a result, in recent years Congress has shown an increasing willingness to impose either mark-to-market taxation or taxation that approximates mark-to-market treatment. In the absence of inflation, accrual taxation eliminates deferral and guarantees that the effective tax rate is the same as the statutory tax rate. With inflation and without indexation, however, accrual taxation means that the effective rate on income from capital may far exceed the statutory rate because the offsetting benefit of deferral has been eliminated.

Table 3 shows the effective tax rate without indexation as a function of the inflation rate, assuming a real growth rate of 5% and accrual taxation with a 30% statutory rate.

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70 See, e.g., IRC § 475 (requiring security dealers to account for their inventory on a mark-to-market basis); IRC § 1256 (mark-to-market taxation for certain financial instruments including regulated futures contracts); David J. Shakow, Taxation Without Realization: A Proposal for Accrual Taxation, 134 U. Pa. L. Rev. 1111 (1986) (arguing in favor of mark-to-market taxation); see also Thomas L. Evans, The Evolution of Federal Income Tax Accounting—A Growing Trend Towards Mark-to-Market, 67 Taxes 824 (1989) (discussing various accounting provisions that approximate mark-to-market accounting); Tax Simplification and Technical Corrections Bill of 1993, H.R. 3419, 103d Cong., 1st Sess., § 402(a) (passed by the House Ways and Means Committee on November 3, 1993) (same adding § 1291 that would require certain shareholders of certain passive foreign corporations to account for their shares on a mark-to-market basis); H.R. 11, 102d Cong., 2d Sess., § 4402 (1992) (adding § 1291 requiring certain shareholders of certain passive foreign corporations to account for their shares on a mark-to-market basis). H.R. 11 was passed by the House and Senate on October 6, 1992, and October 8, 1992, respectively, and vetoed by President Bush on November 4, 1992.

71 See Steuerle, Tax Decade, note 37, at 31 & n.17 (noting that debt instruments and assets that are marked to market are the two classes of assets where the inflation component of the return is fully taxed). But see text following note 173 (discussing certain § 1256 contracts that are marked to market but for which indexing is not required because the taxpayer has no basis).
As demonstrated, even at moderate rates of inflation, the effective rate on gains becomes quite large. With indexation, the effective rate would be equal to the statutory rate of 30% without regard to the inflation rate.

Tables 2 and 3 suggest that the problems of inflation and deferral cannot successfully be dealt with independently. If gains are not indexed for inflation, it may be inappropriate to impose accrual taxation. Alternatively, if gains are indexed for inflation, the justification for not imposing accrual taxation, or its equivalent, is reduced. The relationship between indexation and the holding period also suggests that proposals to restrict indexation to long-term gains require independent justification.

Table 3
Effective tax rate with accrual taxation and no indexation
(5% real growth rate; 30% statutory tax rate)

<table>
<thead>
<tr>
<th>Inflation Rate</th>
<th>Effective Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>30%</td>
</tr>
<tr>
<td>1%</td>
<td>36%</td>
</tr>
<tr>
<td>2%</td>
<td>42%</td>
</tr>
<tr>
<td>3%</td>
<td>47%</td>
</tr>
<tr>
<td>4%</td>
<td>53%</td>
</tr>
<tr>
<td>5%</td>
<td>59%</td>
</tr>
<tr>
<td>6%</td>
<td>64%</td>
</tr>
<tr>
<td>7%</td>
<td>69%</td>
</tr>
<tr>
<td>8%</td>
<td>74%</td>
</tr>
<tr>
<td>9%</td>
<td>80%</td>
</tr>
<tr>
<td>10%</td>
<td>85%</td>
</tr>
<tr>
<td>12.5%</td>
<td>97%</td>
</tr>
<tr>
<td>15%</td>
<td>108%</td>
</tr>
</tbody>
</table>

Accrual taxation can be approximated by a variety of devices including, for example, imposing an interest charge on deferral. See, e.g., IRC § 453A (imposing an interest charge on installment sales); IRC § 1291 (imposing an interest charge on deferral from passive foreign investment companies); Alan J. Auerbach, Retrospective Capital Gains Taxation, 81 Am. Econ. Rev. 167 (1991); Cynthia Blum, New Role for the Treasury: Charging Interest on Tax Deferral Loans, 25 Harv. J. on Legis. 1 (1988); Mary Louise Fellows, A Comprehensive Attack on Tax Deferral, 88 Mich. L. Rev. 722 (1990).

2. Indexation of Loss Assets

In the previous section, I argue that because, as a percentage of real gain, the indexation correction becomes smaller the longer the holding period and because deferral compensates for the failure to index, indexing real gain is less important the longer the holding period. In the case of losses, however, neither of these conditions hold and indexing becomes more critical the longer the holding period. Consider first the size of the inflation adjustment relative to the amount of nominal gain or loss. Where there is a loss in real terms, the size of the inflation adjustment relative to the amount of loss increases with the length of the holding period. Thus, the indexation adjustment becomes more necessary with holding period. Second, in the case of losses, deferral represents a burden to the taxpayer, not an advantage. Just as deferral of gains is equivalent to an interest-free loan from the government to the taxpayer, deferral of losses is equivalent to an interest-free loan from the taxpayer to the government. The fact that indexing is, in certain ways, more important for loss assets than it is for gain assets makes it particularly odd that indexing proposals often are limited to gain assets.  

74 In absolute value terms, the size of the adjustment increases relative to both the nominal loss or gain and the real loss. See note 63 (discussing difference between gains and losses).

75 See, e.g., H.R. 4210, note 73, at § 2101. While it might be expected that gains and losses on capital assets are distributed evenly across income classes, the available evidence suggests that taxpayers with moderate income tend to dispose of assets at a real loss, while higher income taxpayers tend to dispose of assets at a gain. See Internal Revenue Service, Statistics of Income 1990: Individual Income Tax Returns 26 (1993); Congressional Budget Office, Indexing Capital Gains (1990) [hereinafter CBO Capital Gains Report]; Dept of Treasury, Report to Congress on the Capital Gains Tax Reductions of 1978, at 10-11 (1985) (using 1977 data). Roger Brinner reports similar results using 1962 data, but points out that one possible explanation is that because of their lower marginal rates, lower income people tend to hold stocks that pay dividends while higher income persons hold stocks that return a yield in the form of capital gains. Roger E. Brinner, Inflation and the Definition of Taxable Personal Income, in Inflation and the Income Tax, note 29, at 121, 135-37.
3. Indexation and the Lock-In Effect

One justification for indexing capital assets is to reduce the lock-in effect.\textsuperscript{76} The lock-in effect refers to the fact that the holder of an appreciated asset has an incentive to continue to hold the asset even when, in the absence of taxes, she would choose to dispose of the asset. Essentially, the lock-in effect derives from the fact that if the taxpayer continues to hold the asset, she will continue to receive the benefit of deferral on her previous gain, whereas if she disposes of the asset, she will be taxed immediately on the appreciation. Looked at another way, the government offers an interest-free loan to the holder of an appreciated asset in the amount of the tax that would be due on the appreciation. Thus, in order for it to be worthwhile to sell the appreciated asset and acquire a new asset, the expected return from the new asset not only must be greater than the expected return from the old asset, but also must be large enough to compensate for the loss of the implicit interest-free loan. In addition, the lock-in effect is greatly accentuated by the fact that the tax on appreciation is forgiven at death.\textsuperscript{77} In effect, not only is the loan interest-free, but it may be forgiven.\textsuperscript{78} By reducing the amount of taxable gain, indexing clearly reduces the lock-in effect, thus adding to economic efficiency.

Just as appreciated assets are subject to a lock-in effect, depreciated assets are subject to a reverse lock-in effect.\textsuperscript{79} In order to receive the

\textsuperscript{76} Many authors have discussed the lock-in effect with respect to capital gains in general. See, e.g., Walter J. Blum, A Handy Summary of the Capital Gains Arguments, 35 Taxes 247 (1957); Graetz, note 44, at 677 (noting that the lock-in effect “reduces liquidity, impedes the mobility of capital, and may lead to broader fluctuations in market prices”). But see Tax Incentives for Increasing Savings and Investment: Hearings Before the Committee on Finance, United States Senate, 101st Cong., 2d Sess. 86, 88 (prepared statement of Alan J. Auerbach); Alan J. Auerbach, Capital Gains Taxation and Tax Reform, 42 Nat’l Tax J. 391 (1989) (discussing lock-in effect and other distortions from capital gains taxation).

\textsuperscript{77} IRC § 1014 (providing that the basis of property acquired from a decedent is the fair market value of the property, thus eliminating income tax on any prior appreciation).

\textsuperscript{78} An additional factor that may strengthen the lock-in effect is the limitation on capital losses. In any taxable year, an individual may deduct recognized capital losses only to the extent of recognized capital gains plus $3,000. IRC § 1211(b). Capital losses essentially are unusable by a taxpayer without capital gains. It, therefore, may be in a taxpayer’s interest to hold onto an appreciated asset to use it to offset a possible future capital loss. Correspondingly, the lock-in effect is lessened if a taxpayer has current capital losses since the effective tax rate on capital gains is zero for a taxpayer with sufficient capital losses. There are many other details of the Code that may strengthen or lessen the lock-in effect. For example, the availability of nonrecognition treatment for certain transfers of property and the ability with respect to certain charitable donations to take a deduction for the full fair market value of appreciated property both lessen the lock-in effect. See, e.g., IRC § 1031 (permitting nonrecognition of gain on a like kind exchange); IRC § 170(e)(1) (generally permitting a charitable deduction for the full fair market value of long-term capital gain property).

\textsuperscript{79} The combination of the lock-in effect on appreciated assets and the reverse lock-in effect on depreciated assets leads to the behavior sometimes referred to as “cherrypick-
tax benefit of a loss, it generally is necessary to dispose of a depreciated asset. By holding onto a depreciated asset, the holder in essence is making an interest-free loan to the government. As long as there is inflation, indexation has the effect of increasing losses (and possibly converting gains to losses). Thus, there is a potential for indexation to have the undesirable effect of increasing the incentive to dispose of depreciated assets. The magnitude of this reverse lock-in effect is limited, however, by the existence of various rules limiting the ability of taxpayers to take losses, primarily the capital loss limitation. 80

A Congressional Budget Office study notes that relative to an exclusion, indexing may create a positive incentive to sell assets with large gains in order to receive an increased indexable basis. 81 The CBO study offers the following example:

For example, suppose that a taxpayer in the 28 percent tax bracket holds an asset with a current price of $1,000 and a real gain of $900; its basis is thus $100. If future inflation doubles the price level, the taxpayer’s basis would increase to $200. If the taxpayer sells the asset and reinvests the proceeds, however, the basis would be $748 ($1,000 minus tax on the $900 real gain). Future inflation would increase the basis in this case to $1,496. In other words, indexing for future inflation would provide a $100 tax deduction if the old asset was held as compared with a $748 deduction if the old asset was sold and a new one purchased. 82

While the CBO study is clearly correct that, under some circumstances, indexing reduces the lock-in effect to a greater extent than an exclusion, it is important to note that indexation will not create an incentive to sell appreciated assets. 83 The problem with the example given above is that it fails to take into account the value of further

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IRC § 1211; see also IRC § 1092 (limiting losses on a straddle to the extent of unrealized gains from the straddle).

CBO Capital Gains Report, note 75, at 31-32.

Id.

It is straightforward to show that indexing may be more or less successful than an exclusion at reducing the lock-in effect. Consider a zero inflation world. In such a world, an exclusion would be more successful at reducing the lock-in effect than would indexing, which would have no effect whatsoever. On the other hand, consider a hyperinflationary world. In such a world, indexing would be extremely effective at reducing the lock-in effect, while an exclusion would be relatively ineffective.
deferral of the tax liability on the prior appreciation of the asset. Consider what happens to the taxpayer in the above example, assuming that over the period in which there is 100% inflation, there is also 20% real growth. If the taxpayer held onto the asset, she would be able to sell the asset for $2,400.\textsuperscript{84} She would have an indexed basis of $200, gain of $2,200, and pay tax of $616. She would be left, therefore, with $1,784 after tax. If she sold the asset, she would be able to purchase a new asset for $748 that would increase in value to $1,795. She would have an indexed basis of $1,496, gain of $299, and pay tax of $84. She would be left, therefore, with $1,711 after tax, $73 less than she would have had if she had held onto the asset.

It is, in fact, straightforward to prove that with indexation, despite the benefit of the stepped-up indexable basis, it generally will be optimal to hold onto an appreciated asset, trading off the enhanced indexation adjustment for the benefit of further deferral. Define $\delta$ as the difference between the future real after-tax value of the asset if it is held and the future real after-tax value of the alternative investment if the asset is sold. Thus, there is a positive lock-in effect if $\delta$ is greater than zero. $\delta$ can be expressed by the following equation: \textsuperscript{85}

$$\delta = (1 + \pi)^n \times \tau \times (1 - \tau) \times ((1 + r)^n - 1) \times \text{Gain}$$

(1)

where,

- $\pi$ = the inflation rate,
- $\tau$ = the marginal tax rate,\textsuperscript{86}
- Gain = the taxable appreciation of the asset at the time that the decision is made,\textsuperscript{87}
- $r$ = real growth rate; and
- $n$ = number of years from the time the decision is made until the final disposition.

As long as both Gain and $r$ are greater than zero and $\tau$ is between zero and one, $\delta$ always will be greater than zero and, therefore, there will be a positive lock-in effect.\textsuperscript{88} As can be seen from equation (1), $\delta$, and

\textsuperscript{84} $2,400 = 2,000 \times (1 + 20\%) \times (1 + 100\%)$.

\textsuperscript{85} See Appendix II, Section I, for a derivation of Equation (1).

\textsuperscript{86} These results depend critically on the assumption that the marginal tax rate is equal in all periods. For example, if the tax rate is increasing over time, it may well be optimal to recognize the gain on the asset at the current lower rate.

\textsuperscript{87} If indexation applies on a retroactive as well as a prospective basis, Gain is the fair market value of the asset minus its basis indexed to date. If indexation applies to currently held assets, but only on a prospective basis, then Gain is the fair market value of the asset minus its unindexed cost basis. See note 88 (discussing indexing for new assets only).

\textsuperscript{88} By contrast, if indexing is implemented for new assets only, there may be an incentive to sell old assets to receive the benefits of indexing with respect to subsequent inflation.
consequently the lock-in effect, is an increasing function of \( r \), the real growth rate. The lock-in effect increases with the real growth rate because the higher the real growth rate, the more valuable the deferral on the gain.

The lock-in effect in equation (1) is expressed in terms of dollars at the time of final disposition. \( \delta \) also can be expressed in terms of constant dollars, that is dollars at the time the decision is made:

\[
\delta_{\text{const}} = \tau \times (1 - \tau) \times ((1 + r)^r - 1) \times \text{Gain} \tag{2}
\]

Expressed in constant dollars, it becomes clear that in real terms, the size of the lock-in effect, \( \delta_{\text{const}} \), is not a function of the inflation rate. In other words, with indexation, the lock-in effect, in real terms, is independent of the inflation rate. The independence under indexation between the rate of inflation and the lock-in effect should not be surprising. Indexation eliminates the effects of inflation on real after-tax values. As a result, it should be expected that with indexation, the lock-in effect is independent of inflation. By contrast, without indexation, the magnitude of the real lock-in effect increases with inflation.

Under some partial indexation proposals, an indexation adjustment cannot be used to create or increase the amount of a loss. With such a limitation, indexation can create a lock-in effect. Consider, for example, a taxpayer who holds an asset with a value of $1,000, an unindexed basis of $1,000 and an indexed basis of $1,500. Without indexation, the taxpayer has no taxable gain or loss with respect to the asset and has no tax-induced reason to hold or dispose of the asset. Under full indexation, she has a loss of $500, giving her an incentive to dispose of the asset as soon as possible to recognize the loss. Under indexation for gain only, if she disposes of the asset, she would have a $500 unusable indexation adjustment. If, on the other hand, she holds onto the asset, she could use the $500 indexation adjustment against that is, there may be a negative lock-in effect. In general, the less appreciation on the existing asset, the more likely that there will be a negative lock-in effect. See Appendix II, Section II.

89 See Appendix II, Section I (showing that the derivative of \( \delta \) with respect to \( r \), \( d\delta/dr \), is greater than zero).

90 Moreover, the observation that indexation removes the effects of inflation means that in thinking about a world with indexation, it is possible to derive results by thinking about a world with no indexation and no inflation. In such a world, there would still be a lock-in effect because of real deferral.

91 See Appendix II, Section III.

92 See, e.g., H.R. 4210, note 73, at § 2101.
future appreciation in the asset. Thus, she would have a strong incentive not to dispose of the asset.\footnote{CBO Capital Gains Report, note 75. A similar lock-in effect is created whenever the Code provides for a lower basis for losses than for gains. For example, when depreciated property is transferred by gift, the recipient takes a basis for gain equal to the donor’s basis and a basis for loss equal to the fair market value of the property at the time of transfer. IRC § 1015. As a result, a lock-in effect is created because future appreciation will be tax-free to the donor to the extent of the prior loss.}

4. \textit{The Failure to Index Capital Assets as a Proxy Tax on Wealth.}

Another argument against indexation of capital assets is that inflation in an unindexed tax system may have beneficial effects on the tax base. It is possible to view an unindexed tax on capital gains as a combination of a wealth tax and an income tax.\footnote{See, e.g., Peter Diamond, Comments, in Inflation and the Income Tax, note 29, at 322-23; William Vickrey, An Updated Agenda for Progressive Taxation, Am. Econ. Ass’n Papers & Proc. 257 (May 1992). Vickrey argues that an unindexed tax is simply a tax on income plus a percentage of net worth: “it is in many respects a superior tax base, being broader and hence requiring lower marginal rates to achieve a given level of revenue and progressivity.” Id. at 258.} In a world in which all nominal gains and losses were taxable annually, the failure to index would be equivalent to a tax on wealth levied at a rate approximately equal to the taxpayer’s marginal income tax rate times the rate of inflation. Even under the assumption of full accrual taxation, it would be a very peculiar wealth tax whose rate was proportional to the rate of inflation. Without regard to the income tax, inflation has the effect of redistributing income. For example, people with assets paying a fixed rate are hurt by increases in inflation, while people with fixed-rate liabilities are helped. It is not at all clear that it is desirable to compound this implicit redistribution with a variable rate tax on wealth. Finally, it is a wealth tax that is levied only upon realization.

5. \textit{Indexing Versus an Exclusion}

The discussion so far has assumed that capital gains are taxed at the same rate as ordinary income. Historically, of course, this assumption has not been true as generally, capital gains have been subject to reduced rates of tax. Thus, for example, prior to the 1986 Act, individuals were entitled to exclude 60% of recognized capital gains.\footnote{IRC § 1202 (before repeal by Pub. L. No. 99-514, § 301(a), 100 Stat. 2085, 2218).} Under current law, the statutory tax rate on capital gains for individuals is capped at 28%, as compared to a top rate of 39.6% on ordinary income.\footnote{IRC § 1(h) (providing for a maximum tax rate on capital gains of 28%); IRC § 1(a)-(d) (providing tax rates of up to 39.6% on ordinary income). The actual marginal tax rates on both ordinary income and capital gains exceed the statutory rates because of various} One argument voiced in favor of a capital gains exclusion is...
that an exclusion helps compensate for the effects of inflation without the complexity of full-scale indexation. While this view is not without merit, it is important to understand that an exclusion and indexation have very different effects. In particular, relative to indexation, an exclusion will either under- or over-compensate the taxpayer depending on the holding period, the amount of real gain and the rate of inflation.

To see that no single exclusion rate will work in all circumstances, define the optimal exclusion as the percentage exclusion such that a taxpayer is indifferent between indexation and the exclusion. Thus, for example, consider a taxpayer who purchases an asset for $1,000, holds the asset for five years during which time there is 5% annual inflation and the asset appreciates in real terms at 5% per year, and then sells the asset for $1,629. Absent indexation, the taxpayer would have taxable gain of $629. If, however, her basis in the asset were indexed, she would have an indexed basis of $1,276 and gain of only $353. If, rather than indexing her basis, she simply was permitted to exclude a portion of her gain, she would need to be able to exclude 44% of her gain in order to be in the same position as under indexation. Thus, her optimal exclusion would be 44%. As indicated above, however, her optimal exclusion depends on her exact holding period, real gain and the inflation rate. Table 4 shows how the optimal exclusion rate varies as a function of those factors.

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98 The purpose of the exclusion is presumed to be to put the taxpayer in the same position under indexation and the exclusion. Neither the exclusion nor indexation takes into account the benefit of deferral.

99 $1,629 = $1,000 \times 1.05^5 \times 1.05^5$. 

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phaseouts based on adjusted gross income. See, e.g., IRC § 67(a) (2% floor on miscellaneous itemized deductions); IRC § 68(a) (phaseout of itemized deductions); IRC § 151(d)(3) (phaseout of personal exemptions).
### Table 4

Exclusion rate as function of holding period, inflation rate and real growth rate

(Except as shown, assumes 5-year holding period, 5% inflation and 5% real growth)

<table>
<thead>
<tr>
<th>Holding Period</th>
<th>Exclusion Percent</th>
<th>Inflation Rate</th>
<th>Exclusion Percent</th>
<th>Real Growth Rate</th>
<th>Exclusion Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>49%</td>
<td>0%</td>
<td>0%</td>
<td>-5.0%</td>
<td>-2221%</td>
</tr>
<tr>
<td>2</td>
<td>48%</td>
<td>1%</td>
<td>15%</td>
<td>-2.5%</td>
<td>222%</td>
</tr>
<tr>
<td>3</td>
<td>46%</td>
<td>2%</td>
<td>25%</td>
<td>0.0%</td>
<td>100%</td>
</tr>
<tr>
<td>4</td>
<td>45%</td>
<td>3%</td>
<td>33%</td>
<td>2.5%</td>
<td>62%</td>
</tr>
<tr>
<td>5</td>
<td>44%</td>
<td>4%</td>
<td>39%</td>
<td>5.0%</td>
<td>44%</td>
</tr>
<tr>
<td>6</td>
<td>43%</td>
<td>5%</td>
<td>44%</td>
<td>7.5%</td>
<td>33%</td>
</tr>
<tr>
<td>7</td>
<td>42%</td>
<td>6%</td>
<td>48%</td>
<td>10.0%</td>
<td>26%</td>
</tr>
<tr>
<td>8</td>
<td>40%</td>
<td>7%</td>
<td>51%</td>
<td>12.5%</td>
<td>21%</td>
</tr>
<tr>
<td>9</td>
<td>39%</td>
<td>8%</td>
<td>54%</td>
<td>15.0%</td>
<td>18%</td>
</tr>
<tr>
<td>10</td>
<td>38%</td>
<td>9%</td>
<td>56%</td>
<td>17.5%</td>
<td>15%</td>
</tr>
<tr>
<td>15</td>
<td>32%</td>
<td>10%</td>
<td>58%</td>
<td>20.0%</td>
<td>13%</td>
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<tr>
<td>20</td>
<td>27%</td>
<td>11%</td>
<td>60%</td>
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<td>11%</td>
</tr>
<tr>
<td>25</td>
<td>23%</td>
<td>12%</td>
<td>61%</td>
<td>25.0%</td>
<td>10%</td>
</tr>
<tr>
<td>30</td>
<td>19%</td>
<td>13%</td>
<td>62%</td>
<td>27.5%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Thus, for example, Column A shows that if she held the asset for only one year, her optimal exclusion would increase to 49%, while if she held the asset for 20 years, it would drop to 27%. Similarly, Column B shows that as the inflation rate varies from 0% to 13%, the optimal exclusion varies from 0% to 62%. Thus, if an exclusion is set to compensate for an expected rate of inflation, the exclusion either will be insufficient or overgenerous as inflation rises or falls relative to the expected rate.

Even more significant is the variance of the optimal exclusion with respect to the real growth rate. Column C shows that as the asset’s real growth rate varies from 0% to 27.5%, the optimal exclusion falls from 100% to 8%. Thus, under a fixed exclusion, taxpayers whose investments do well are taxed at a low rate, while those whose investments do poorly are taxed at a high rate. An exclusion operates in a particularly perverse fashion when taxpayers have nominal losses. In real terms, a taxpayer with a nominal loss has a larger (in absolute
IV. ADMINISTRATIVE AND PRACTICAL CONSIDERATIONS IN INDEXING CAPITAL GAINS

As a practical matter, the decision to index and how to index depends to a large extent on the practical details of indexation. In particular, as anyone who has dealt with the tax law knows, the concept of basis is central to the taxation of income from capital. As a result, the implications of indexing basis are manifold. The purpose of this Section is not to try to deal exhaustively with such issues, but rather to illustrate the type of issues that arise and the solutions that are needed.\(^{102}\)

A. Timing of the Indexation Adjustment

One issue that arises is the timing of the indexation adjustment.\(^{103}\) If all nominal gains were taxed on a current basis, the timing of the indexation adjustment would be straightforward. Once the realization concept is introduced, however, the timing of the indexation adjustment becomes less clear and, to a certain extent, arbitrary. In general, the optimal timing of the adjustment depends on the goal of indexation. One possible goal is to make the real effective tax rate independent of the rate of inflation. In that case, the inflation adjustment should be made whenever the inflationary gain otherwise would be taxable. A second possible goal is to make the real effective

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100 See note 74 and accompanying text (discussing the need for indexing loss assets). The discussion in the text assumes that an exclusion would operate to reduce capital losses as well as reduce capital gains. See, e.g., IRC § 1211 (b)(1)(C)(ii).
101 See CBO Capital Gains Report, note 75, at 13-14 (discussing the effect of indexing versus an exclusion on assets that pay a current yield).
102 In particular, the problems of indexing pass-through entities, such as partnerships, are not discussed in this Article. Partnerships and partnership interests pose significant complexities that must be dealt with under any indexation scheme.
tax rate as close to the statutory rate as possible. In that case, the timing of the inflationary adjustment would depend on the timing of the nominal gain (that is, both the inflationary and the real gain) relative to the timing of gain under a full accrual system. A final consideration is the administrability of any proposed adjustment.

To understand the implications of these goals, consider several possible assets: 1) an asset taxed on a full accrual basis; 2) vacant land held for investment; 3) an asset paying a current yield equal to the nominal rate (such as debt); and 4) dividend-paying stock.

The easiest case is the full accrual asset. Since all gains and losses are taxed on a current basis, it must be the case that inflationary gains are being taxed currently. Therefore, if the goal is to neutralize the effects of inflation, the inflationary adjustments should be made currently. Correspondingly, if the inflation adjustment is made currently, the remaining real gain will be taxed currently and the effective tax rate will equal the statutory rate. Accounting for the inflation adjustment currently is also the simplest approach administratively. Thus, all three goals imply the same timing of the inflation adjustment.

With the vacant land, both nominal and real gains are taxed only upon disposition. Therefore, if the goal is to make the effective tax rate invariant to the inflation rate, the inflation adjustment must be taken at the time of disposition. From an administrative point of view, waiting until disposition of the asset is also most convenient. If, on the other hand, the goal is to time the inflation adjustment so as to make the effective tax rate as close as possible to the statutory rate, the appropriate timing is somewhat unclear. Given that gain on the property has been deferred, if the inflation adjustment is taken at the time the property is disposed of, the effective tax rate will be less than the statutory rate. If the goal is to increase the effective tax rate, the inflation adjustment would have to be taken after the disposition of the property. Given the impracticality of delaying the adjustment until after the disposition of the property, the best solution again would be to take the adjustment at the time of disposition.

In the case of the asset that pays a current yield equal to the nominal rate, such as debt, the appropriate time to take the indexation adjustment under either of the suggested standards is on an annual

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104 The simplest way to ensure that the effective rate is equal to the statutory rate is to tax the asset under a fully indexed current accrual system.

105 Accounting for the inflation adjustments on an annual basis is not a unique solution. For example, it would be possible to maintain an effective tax rate equal to the statutory rate by accelerating some adjustments and delaying others. It is difficult, however, to see the advantage of such an approach.
Because all of the yield is paid out currently, it must be the case that the inflationary yield is paid currently and, therefore, if the goal is to correct the inflationary yield, the adjustment must be current. Similarly, since the entire real yield is paid and taxed currently, the effective tax rate will equal the statutory rate if the yield is paid currently. Finally, although there are administrative advantages to making a single inflation adjustment upon termination, there are also administrative advantages to adjusting for inflation on an annual basis, rather than taxing the holder on an overstated yield currently and later permitting a loss due to the accumulated inflation adjustment.

The dividend-paying stock is perhaps the most difficult case. Consider, for example, stock that pays a 4% dividend and appreciates by 4% per year in an environment where the inflation rate is 4%. It is possible to characterize the dividend payments as payment of the real income from the stock and the growth in the stock as inflationary, but such a characterization is inherently arbitrary. It would be equally possible to characterize the dividend payments as payment of the inflationary gains and the growth of the stock as the real yield (or any combination of the two). Thus, if the goal is to time the inflation adjustment to coincide with the recognition of the inflationary income, there is no unique solution. If the goal is to tax the stock so that the effective rate is as close as possible to the statutory rate, the appropriate time to permit the inflation adjustment is at the time of disposition. Finally, on administrative grounds, it is probably simpler to defer the adjustment, rather than permitting an annual adjustment.

As the preceding discussion demonstrates, absent a uniform system for taxing all real and inflationary gains on capital assets, there is no uniform answer for when the inflation adjustment should be taken. In general, to the extent the current income from the asset includes the full nominal gain, the inflation adjustment should be permitted on a current basis. Assets that fall in this category include debt instruments and assets subject to mark-to-market or expected mark-to-market taxation such as § 1256 contracts and inventories accounted for on a mark-to-market basis. Where the current yield on the asset is less than or equal to the real yield, such as in the example of vacant land

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106 It is possible to argue that only expected inflation should be accounted for on an annual basis and the difference between expected and actual inflation should be accounted for upon disposition. The better approach, however, is not to make any attempt to distinguish between actual and expected inflation. See Section IX for a discussion of indexation of debt.

107 Given the assumption that the current dividend is equal in amount to the real yield, by deferring the inflation adjustment, the tax burden on the stock is the same as under a fully indexed, full accrual world. This discussion ignores the existence of the corporate tax.

108 For a more complete discussion of indexing full accrual assets, see text following note 173. Depreciable property is another type of asset where the nominal income can be
held for investment, the indexation adjustment should be deferred until a taxable disposition of the asset. Where the current yield falls between the real yield and the nominal yield, the outcome is less clear. In theory, the optimal solution would be to permit part of the inflation adjustment currently and defer the remaining adjustment. As a practical matter, such a division is likely to be impractical. The choice, therefore, is either to overtax the asset by deferring the adjustment until disposition, or to undertax the asset by permitting the deduction currently.

The potentially more serious problem raised by having different rules for different types of assets, is the need to identify the category within which a particular investment falls. Due in large part to the rules for taxing debt instruments, debt generally will fall in the current adjustment category. Similarly, given the general rules for taxing stock, stock will fall into the deferred adjustment category. On the other hand, there may be cases where it is more reasonable to defer the adjustment for debt and to make the stock adjustment currently. For example, income on debt that pays contingent interest is often deferred, while preferred stock that pays a fixed dividend and does not participate in growth would seem to fit the current yield model. Thus, relying on traditional debt/equity distinctions to determine the timing of indexation adjustments may not always be advisable.

B. Indexing the Treatment of Dividends

As discussed above, the timing of indexation adjustments with respect to assets that pay periodic dividends or similar amounts is uncertain. This uncertainty as to the timing of the inflation adjustment follows from the basic uncertainty as to the timing of income caused by the realization doctrine. Without regard to the level of inflation, it is necessary to decide whether a payment to the owner of an asset is in the nature of income or is a return of capital. The characterization of payments with respect to stock is a case in point. Periodic pay-
ments with respect to corporate stock generally are presumed to be payments of income (dividends) to the extent of earnings and profits.\(^{111}\) If there are inadequate earnings and profits, payments are treated as a return of capital.\(^{112}\) Finally, payments in excess of basis are treated as gain on the sale of the stock.\(^{113}\) These rules are essentially arbitrary, but are necessary given the arbitrary nature of the realization requirement. Similarly, under indexing, any payment (or deemed payment) must be characterized as income or as a return of indexed basis. To properly characterize a payment, several steps are required. First, the earnings and profits of the corporation should include only real, not inflationary, gains.\(^{114}\) Second, because they include historical calculations used for current purposes, the earnings and profits account itself must be indexed. Finally, if the payment is treated as a return of capital, the shareholder’s basis must be indexed. The following example demonstrates this procedure.

**Example 2:** Sarah contributes $100 to a corporation. The corporation invests in a single asset. After one year, the corporation sells the asset for $115.50. Inflation during the period that the corporation held the asset was 10%. The corporation has indexed gain of $5.50\(^{115}\) and, at a 34% rate, pays tax of $1.87, leaving it with $113.63. The corporation would have earnings and profits of $3.63 (the indexed gain minus the corporate tax).\(^{116}\)

Assume that the corporation pays out all of its cash.\(^{117}\) The first $3.63 would be treated as a taxable dividend to Sarah. The remaining $110 would be treated as a return of basis. Sarah would have no gain or loss because her original basis of $100 would have been indexed to $110.

Assume that instead of paying out the cash, the corporation invests the $113.63 in a second asset and holds the asset for five additional years during which time the asset appreciates by exactly the rate of inflation (10% per year). After five years, the corporation sells the asset for $183.00.\(^{118}\) The cor-

\(^{111}\) IRC § 316 (defining “dividend”).

\(^{112}\) IRC § 301(c).

\(^{113}\) IRC § 301(c)(3)(A).

\(^{114}\) Thus, for example, depreciable property and inventory owned by the corporation must be indexed. See Section VII (indexing depreciable property) and Section VIII (indexing inventory).

\(^{115}\) $5.50 = $115.50 - ($100 \times 1.10)$.

\(^{116}\) See IRC § 312 (providing rules for adjusting earnings and profits).

\(^{117}\) The example assumes that the payments from the corporation are not treated as a redemption or liquidation.

\(^{118}\) $183.00 = $113.63 \times 1.10^5$. 
C. Determining the Proper Indexing Period

To determine the proper indexing adjustment, in theory, it is necessary to know the precise period for which the indexing adjustment is to be made and the precise amount of inflation over that period. In practice, it generally is desirable to trade off some degree of accuracy for administrability. In this light, the current system can be viewed as the ultimate tradeoff of accuracy for administrability, since it is equivalent to an indexation system where it is presumed either that the inflation rate is zero or that the indexation holding period is always zero. Against this benchmark, almost any change would be an improvement.

Thus, for example, it is reasonable to use conventions to simplify issues such as the holding period and the amount of inflation over the holding period. On the other hand, it is important not to create a system where there are strong incentives for taxpayers to make tax driven decisions. For example, it would be simplest perhaps to require taxpayers to round their holding period to the nearest year, which would permit the Service to publish tables of annual indexing adjustments and would permit taxpayers to aggregate investments made within a year. If, however, the holding period were rounded to the nearest year, there would be strong incentives for taxpayers to hold onto assets until just after they could receive another full year's indexation. The use of a shorter rounding period, such as a quarter, would increase the administrative burden, but perhaps would provide less incentive to hold onto assets merely to receive greater indexation.

\[ \text{Indexed Basis} = \text{Original Basis} \times (1 + \text{Inflation Rate})^t \]

119 \( \$5.85 = \$3.63 \times 1.10^5 \).

120 Sarah's indexed basis would be $177.15. $177.15 = $100 \times 1.10^6$.

121 NYSBA Report, note 53, at 767 (noting that taxpayers would have an incentive to hold onto assets just long enough to qualify for a indexation adjustment.)
An approach that may have merit would be to permit taxpayers to elect to use a more exact indexing method. Thus, sophisticated taxpayers could index based on an exact holding period, while unsophisticated taxpayers could index based on an approximate holding period. If the approximate holding period rules required taxpayers to round their holding period down to the nearest unit (such as a year or quarter), an option to use an exact holding period would mean that a taxpayer who wished to dispose of an asset and was sensitive to the indexing rules could elect to use an exact holding period, rather than continuing to hold onto the asset until the next unit was reached. For example, assume that the normal rules rounded down the holding period to the nearest whole year. A taxpayer who wished to sell an asset that he had held for a year and 11 months would not need to hold onto the asset for another month to receive an indexing period longer than one year. He could, instead, simply elect to index based on his actual 23-month holding period. Thus, the holding period rules could be designed to avoid any lock-in effect.

In any event, it should be evident that a clear disadvantage of indexing is that the holding period is much more significant than under current law. Even with a capital gains differential, the holding period generally is relevant only for determining whether an asset has been held for more than or less than the statutory holding period—historically six months to a year. Once an asset has been held for the prescribed period, its holding period is no longer relevant.

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122 Of course, the shorter the indexing period, the less additional time that an asset has to be held to receive the benefit of a greater indexing adjustment. Treasury recommended a quarterly indexing adjustment as part of their 1984 tax reform proposals. Treasury Dep't, 2 Tax Reform for Fairness, Simplicity, and Economic Growth 183 (1984) [hereinafter Treasury I].

123 While it is likely that the Service would publish tables of indexation adjustments only for the longer approximate holding periods, it would be reasonable to permit taxpayers to interpolate between dates on the table to compute the adjustment for exact holding periods.

124 If such an election were permitted, there would be little reason not to permit it to be made on an asset-by-asset basis since the election essentially is uniformly in favor of the taxpayer and merely permits the taxpayer to compute his taxes on a more accurate basis. Permitting such an election might raise a concern that unsophisticated taxpayers (who presumably would not make the election) always would be treated less favorably than sophisticated taxpayers (who presumably would make the election).

125 If he chose to hold onto the asset for another month, he would receive another month's indexation, but the extra month of indexation merely reflects his actual additional holding period of one month.

126 The holding period for long-term capital gains treatment is currently greater than one year. IRC § 1222(3). The holding period is significant for a number of provisions. See, e.g., IRC § 1(h) (providing for a maximum rate of 28% on net long-term capital gains); IRC § 170(e)(1) (providing more favorable rules for charitable donations of long-term appreciated property). The rules for determining holding period are contained in § 1223.
With indexation, a taxpayer would need to know and retain evidence of the acquisition date (or at least the acquisition year) until the property is sold. More significantly, holding period issues can become tremendously complex in substituted basis transactions, particularly where the basis (and holding periods) of several items of property are combined to form the basis (and holding period) of a single new piece of property (such as in a tax-free incorporation). To some extent, the administrative burden of holding period issues can be reduced by tracking indexed basis as an ongoing matter. For example, where the basis of several assets is combined to determine the substituted basis in a new asset, the only information that would have to be carried forward is the aggregate indexed basis, and not the holding period of each separate component of basis.

Another difference between determining the holding period for conventional capital gains analysis and for indexing is the manner in which the starting point for the holding period is ascertained. For purposes of determining eligibility for long-term capital gains treatment, the holding period of an asset generally begins when the taxpayer first acquires the assets. For purposes of indexing, in theory, every payment with respect to an asset needs to be indexed separately from the day the payment is made until the day that the payment is accounted for.

Example 3: Randy agrees on January 1, 1990 to purchase the Mona Lisa for $1,000 for delivery on January 1, 1992. Because of the various up-front expenses incurred by the seller, Randy agrees to pay $500 on January 1, 1991 and to pay the remaining $500 on January 1, 1992. On January 1, 1995, Randy agrees to sell the Mona Lisa for $2,000 cash on January 1, 1996. Assume for tax purposes, that Randy is treated as the owner of the property for the period January 1, 1992, through January 1, 1996 and that the early payment of the purchase price is not treated as a loan. Assume that inflation is 10% per year.

Randy's tax liability for the sale is determined as of January 1, 1996. His amount realized is $2,000. The only question is his properly indexed cost basis. Randy paid $500 in January 1, 1991 dollars and $500 in January 1, 1992 dollars for the painting. To properly measure his 1996 gain, both of these amounts must be indexed to 1996 dollars. Therefore,

127 See, e.g., IRC § 358(a).
128 IRC § 1223.
Randy's indexed basis is $1,537.31. Note that his unindexed gain would have been $1,000 and, if all payments had been treated as being made on January 1, 1992, his indexed gain would have been $535.90.

In the above example, the key is not the dates of ownership, but the dates that cash is paid. Although, in theory each separate payment must be separately indexed, as a practical matter, it would be possible to aggregate payments made within specified intervals, thereby lessening the administrative burden in cases involving multiple payments.\(^\text{130}\)

An alternative approach for dealing with both prepayments and deferred payments is to treat the prepayment or deferred payment as a separate debt instrument and to separately index the debt instrument.\(^\text{131}\)

**D. Options to Purchase Assets**

The amount paid by the purchaser of an option (the "premium") should be indexed from the date of payment.\(^\text{132}\) In addition, if the option is exercised later, the payment of the strike price should be indexed from the date of exercise.

Example 4: Tristan pays $10 on January 1, 1990 for the right to buy one share of IBM stock on January 1, 1991 for $100. There is 10% inflation.

Assume, first, that the option expires worthless. Tristan would have a capital loss on January 1, 1991 when the option expires. The amount of his loss would be $10 in 1990 dollars. His correctly indexed loss is $11.

Assume in the alternative that Tristan exercises the option on January 1, 1991 and sells the stock so acquired one year later on January 1, 1992. Tristan has made two capital invest-

\(^{129}\) $1,537.31 = ($500 \times 1.10^3) + ($500 \times 1.10^4).

\(^{130}\) The effect of rounding off a holding period to the nearest year or quarter is to aggregate all payments made within the year or quarter. If exact holding periods are used, the taxpayer can simplify the administrative burden of keeping track of separate payments by maintaining a running total of indexed basis. See text following note 141.

\(^{131}\) If the prepayment or deferred payment were treated as a separate debt instrument, it would be possible to impute a real interest component to the separate debt instrument as well as to index the instrument. See generally Daniel I. Halperin, Interest in Disguise: Taxing the "Time Value of Money," 95 Yale L.J. 506 (1986); Robert H. Scarborough, Payments in Advance of Performance, 69 Taxes 798 (1991) [hereinafter Payments]; Shuldiner, General Approach, note 79.

\(^{132}\) Similarly, the premium paid for a cash-settlement option also must be indexed for both the buyer and writer of the option.
ments in the stock. First, he invested $10 in 1990 dollars. Second, he invested $100 in 1991 dollars. Each investment must be indexed over the correct period. His indexed basis is therefore $122.10.

In the case of the sale of a call option, the amount realized, not the basis, must be indexed. In general, the seller of an option has no income until the option is exercised or expires worthless. At that time, the seller takes the premium into income. Under an indexing system, the amount of the premium should be indexed from the date received through the date taken into income.

Example 5: Assume Grace is the seller of the option purchased by Tristan in Example 4. Grace therefore receives a $10 option premium on January 1, 1990.

Assume that the option expires worthless. Under current law, Grace would have income of $10 on January 1, 1991. This income, however, is measured in 1990 dollars. To properly adjust for the fact that the tax is being paid in 1991 dollars, the income should be indexed. Therefore, her correctly indexed gain is $11. The amount of the seller’s gain is, of course, exactly equal to the amount of the buyer’s loss.

Alternatively, assume that Tristan exercises the option paying Grace the $100 strike price on January 1, 1991. Grace has now received two payments. First, she received $10 in 1990 dollars. Second, she received $100 in 1991 dollars. The $10 payment must be indexed to 1991 dollars. Grace’s amount realized, properly measured in 1991 dollars, is therefore $111. For purposes of determining Grace’s gain, her basis in the stock, of course, also would be indexed.

E. Treatment of Improvements and Other Subsequent Capital Investments

The treatment of capital improvements is straightforward. As with an option premium, every dollar invested in an asset must be ex-

\[ \text{Indexed Basis} = (\text{Investment} \times 1.10^2) + (\text{Investment} \times 1.10). \]

The sale of an option is an example of a much broader principle, namely that liabilities as well as assets require indexation.

Virginia Iron Coal & Coke Co. v. Commissioner, 37 B.T.A. 195 (1938) (holding that option premium was income in the year that option was surrendered), aff’d, 99 F.2d 919 (4th Cir. 1939), cert. denied, 307 U.S. 630 (1939).

Id.

\[ \text{Indexed Gain} = \text{Premium} \times 1.10. \]

\[ \text{Indexed Realization} = (\text{Premium} + \text{Premium}) \times 1.10. \]
pressed in terms of dollars in the year of sale. Therefore, each addition to basis should be indexed separately according to the time the original investment was made.

Example 6: Liza purchases property in 1990 for $1,000. In 1995, she makes a $500 improvement to the property. Under § 1016(a)(1), $500 is added to Liza's basis in the property. Liza sells the property in 1997. Assume that inflation is 10% per year between 1990 and 1995, and 5% a year between 1995 and 1997.

Liza's indexed basis consists of two parts, her indexed basis from her original purchase, $1,776,139 plus her indexed basis from her improvement, $551.140 Her total indexed basis is, therefore, $2,327.

An equivalent procedure to determine indexed basis is to keep a running total of indexed basis. Under this procedure, the cost of a capital improvement simply is added to the indexed basis to date. That total is then indexed forward. This procedure works equally well for reductions to basis.141

Example 7: In Example 6, Liza's indexed basis could be determined by keeping a running total. In that case, her indexed basis immediately prior to the $500 capital improvement would be $1,611.142 Her indexed basis immediately after the capital improvement would be $2,111.143 Her indexed basis at the time of sale, $2,327, would be determined by indexing the $2,111 figure for an additional two years.144 Her total indexed basis determined under the cumulative approach is the same as it is when separately tracked and indexed in Example 6.

It is important to remember that capital improvements include not only physical improvements to property, but any amount that must be capitalized under existing law. For example, any expense required to be capitalized under the uniform capitalization rules145 should be in-

139 $1,776 = $1,000 \times 1.10^5 \times 1.05^2.$
140 $551 = $500 \times 1.05^2.$
141 For a discussion of holding period, see text following note 120.
142 $1,611 = $1,000 \times 1.10^5.$
143 $2,111 = $1,611 + $500.$
144 $2,327 = $2,111 \times 1.05^2.$
145 IRC § 263A; see also Indepco v. Commissioner, 112 S. Ct. 1039 (1992) (requiring certain costs of arranging for a friendly takeover to be capitalized because they were expected to generate a future benefit).
dexed in the same manner as physical capital improvements. As a practical matter, it probably would be necessary to adopt conventions to simplify the tracking of such expenditures. For example, it would be possible to treat all expenditures under a certain threshold as if they were made at the end of the taxable year or at some other specified time.146

F. Dividend Reinvestment Plans

Similar issues of complexity are raised by the existence of dividend reinvestment plans, which are generally available with regulated investment companies ("mutual funds") and many other large corporations.147 If an individual invests in a mutual fund with a monthly dividend reinvestment plan for 10 years, the individual will have 120 distinct blocks of stocks, each with its own basis and holding period.148 For the average taxpayer, indexing would appear to present a formidable obstacle.

The example, however, overstates the problem caused by indexing. First, much of the complexity exists in the absence of indexing. Under current law, the taxpayer still would have 120 distinct blocks of stock, each with its own basis. Upon sale, the taxpayer would be required to specifically identify which shares he was selling or would be subject to a first-in first-out rule for allocating basis.149 Second, depending on the convention adopted for determining the length of the indexation period, the number of separate indexing computations may be far fewer. For example, if all purchases are presumed to be made on the last day of the taxable year, the taxpayer would have only 10 indexing factors to use in computing his gain or loss on sale.

Finally, even without indexing, there is a strong argument to be made for requiring broker reporting of gain, rather than gross sale proceeds, on the sale of shares of mutual fund stock.150 Such a report-
ing requirement would be likely to greatly increase the accuracy of reported gain on the sale of mutual fund shares. If such a reporting requirement were adopted, indexing would pose only a small additional burden to the reporting entities.\textsuperscript{151}

\section*{G. Short-Term Investments}

Proposals for indexing frequently require minimum holding periods.\textsuperscript{152} While such rules may be dictated by administrative concerns or by other policy considerations (such as a desire to encourage long-term investment), there is no underlying theoretical basis for such rules. In fact, as discussed above,\textsuperscript{153} inflation has a more significant effect on the mismeasurement of gain from short-term investments than it does on long-term investment. The following two examples illustrate this point. The examples assume a continuous 5\% real growth rate and 10\% inflation rate.

\textit{Example 8:} Chris purchases an asset for $100. He holds the asset for one month and sells the asset for $101.21. Chris’ nominal gain is therefore $1.21, his indexed basis is $100.80 and his real gain is $0.41. Inflation has caused his gain to be overstated by a factor of three.

\textit{Example 9:} Angelica purchases an asset for $100. She holds the asset for 10 years and sells it for $422.49. Her nominal gain is $322.49, her indexed basis is $259.37 and her real gain is $163.12. Inflation has caused her gain to be overstated by a factor of two.

\textsuperscript{151} I do not mean to suggest that shifting the burden to the mutual fund is without cost, but only that the cost would not be as great as some have suggested, and that the burden would be borne most efficiently by the mutual fund. See, e.g., Edwin S. Cohen, The Pending Proposal to Index Capital Gains, 45 Tax Notes 103, 104-05 (Oct. 2, 1989) (stating that individual taxpayers would make a large number of mistakes in any indexing system, and would expect “professionals” such as brokerage houses to include indexing results on brokerage and other reports). An intriguing possibility would be to permit mutual funds to elect to report indexed gains and provide that a taxpayer would be entitled to indexing only if reported by the mutual fund. I would guess that most mutual funds would make the election. Some mutual funds already report taxable gain as a courtesy to their shareholders. If mutual funds were required to report indexed gains, it would be necessary to provide uniform rules for determining holding periods so that the indexed basis reported by the mutual fund was not affected by any shareholder election.

\textsuperscript{152} See, e.g., H.R. 4210, note 73, at § 2101 (providing for a minimum one-year holding period). Treasury I had a somewhat more lenient requirement of a full calendar quarter. Treasury I, note 122, at 183. Even under Treasury I, however, a taxpayer could hold an asset for almost six months and still not be entitled to an inflation adjustment.

\textsuperscript{153} See text accompanying notes 58-69.
Examples 8 and 9 demonstrate that as a percentage of the gain, the inflation adjustment is greater the shorter the holding period. In addition, the taxpayer in the later example benefits from deferral. The fact that, in the absence of indexation, the mismeasurement of short-term gain is more pronounced than the mismeasurement of long-term gain suggests the need to develop indexing rules that work for short-term as well as long-term gain.

H. Short Sales

A short sale is a transaction where a person sells property that he has borrowed. A short sale is closed when the short seller returns the borrowed property (the “replacement property”). The replacement property may be newly purchased or may be property already owned by the seller. When a person makes a short sale of property that is substantially identical to property he currently owns, the transaction is referred to as “selling short against the box.” Where the person does not own substantially identical property, the transaction is referred to as a “naked short sale.”

A short sale against the box can be used to lock in gain or loss on property owned by the taxpayer, while postponing the sale of the property. This may be done for tax-motivated reasons, such as deferring the gain on the sale, or for nontax reasons. A naked short sale is equivalent to a bet that the value of the property will decline before the short seller is required to cover his position. A naked short sale may be entered into for speculative reasons or may be entered into to hedge other activities of the taxpayer. For example, short sales of Treasury bonds can be used to hedge anticipated borrowings.

A short seller receives cash in one period (at the time of the short sale) which is not taken into income until a later period (when the short sale is closed). At that time, gain or loss is determined by comparing the amount realized on the short sale with the basis of the property used to close the short sale. As with the sale of an option,  

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154 For a discussion of the need for indexing with short holding periods, see text following note 57.
155 See text following note 64.
157 If interest rates decline, bond prices will rise and the short seller will have a loss on the short sale. He will, however, get the offsetting benefit of lower borrowing costs. Similarly, if rates rise, he will have a profit on the short sale, but will suffer increased borrowing costs.
158 IRC § 1233.
159 Under current law, there are rules designed to prevent taxpayers from converting short-term gain into long-term gain by selling short against the box. IRC § 1233(b); see
in order to properly reflect the short seller’s economic gain stated in terms of dollars at the time of the closing of the short sale, the amount received at the time of the short sale must be indexed.

**Example 10:** Diva thinks IBM stock, which is currently trading at $100, is overvalued. Accordingly, in June 1990, she sells 50 shares of IBM short for $5,000. Her broker borrows the necessary shares for delivery. One year later, when IBM is selling for $95, she closes out the short sale by having her broker purchase 50 shares to replace the borrowed shares. Her cost for closing out the short sale is $4,750. Her unindexed gain is, accordingly, $250.

Given inflation, Diva’s gain is mismeasured because the amount received is measured in 1990 dollars while her basis is measured in 1991 dollars. To correctly measure her gain in 1991 dollars, her amount realized must be indexed. Accordingly, assuming 10% inflation, her gain should be $750.\(^{160}\) Indexing has the effect of increasing her gain by $500 or 200%.

**Example 10** assumes that the indexation adjustment would be taken when the short sale is closed. In some cases, however, it may be more appropriate for the indexation adjustment to be taken while the short sale is still open. A short seller generally is required to make payment to the lender of the property being sold short in lieu of any missed dividends. Similarly, if a debt instrument is sold short, the short seller would make payments in lieu of any missed coupons. As a general rule, the timing of the indexation adjustment on a short sale should correspond to the timing of the indexation adjustment on the underlying property. Thus, assuming that the indexation adjustment on the underlying stock would be made upon disposition of the stock, it would be appropriate for the indexation adjustment on the short sale of stock to be made when the short sale is closed.\(^ {161}\) Correspondingly, assuming that the indexation adjustment on the underlying debt would be made currently, it would be appropriate for the indexation adjustment on the short sale of debt to be made currently.

Absent indexing, a person who sells short against the box has an inflation induced overstatement of gain on his long position and an inflation induced understatement of gain on his short position at the

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\(^{160}\) $750 = ($5,000 \times 1.10) - $4,750.

\(^{161}\) See text accompanying notes 106-07 (discussing the timing of indexation adjustments on stock and debt).
time at which he closes out his short position. The fact that these two mismeasurements are in the opposite direction suggests that instead of indexing both positions, it might be possible to index neither position for the period in which the short sale is open. In general, however, the two inflation adjustments will be of different magnitudes and, therefore, will not offset each other. If, at the time the short sale is entered into, the long position has a real unrealized gain, indexing both positions will produce a net increase in taxable income. If, at the time of the short sale the long position has a real unrealized loss, indexing both positions will produce a net decrease in taxable income. It is only in the case where there is no real unrealized gain or loss on the long position that the two indexing adjustments will be exactly offsetting. Since taxpayers tend to sell short against the box when the long position has an unrealized gain, on average a rule with no indexing during a short sale against the box is likely to be beneficial to taxpayers and subject to abuse.

Example 11: Assume the same facts as in Example 10, except that Diva also owns 50 shares of IBM at the time of the short sale. Moreover, assume that her indexed basis in the IBM stock is $5,000. Thus, if she sold her long position, she would have no gain or loss. One year later, Diva closes out her short position and has an indexed gain of $750. Her unindexed gain would have been $250. Indexing, therefore, increases her gain by $500.

At the same time, Diva sells her long position for $4,750. After indexing her basis for the remaining year, Diva has a $750 loss on the sale of the stock. If Diva were not permitted to index the long position while she was also in a short position, her loss would have been only $250. Therefore, indexing for the additional year increases her loss by $500.

Combining the two transactions, both with and without indexing, Diva would have net income of zero. In this example, where there is no unrealized gain or loss in the long

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162 See, e.g., H.R. 4210, note 73 (providing that the holding period for indexing will be tolled when a taxpayer has a short sale against the box).

163 If the long position is selling at a loss, it generally will be in the taxpayer's interest to sell the long position, thereby recognizing her loss. If the long position is selling at a gain, it will be in the taxpayer's interest to hold the long position, thereby deferring her gain. It seems reasonable, therefore, to conclude that most short sales against the box involve appreciated assets.

164 $750 = $4,750 - ($5,000 \times 1.10)$.

165 $250 = $4,750 - $5,000$. 
position, Diva and the fisc are indifferent as to indexing over the period in which she has a short sale against the box.

Example 12: Assume the same facts as in Example 11, except that Diva’s indexed basis at the time of the short sale is only $1,000. Thus, if she were to sell her long position, she would have a gain of $4,000.

As in Example 11, when Diva closes out her short position, she has an indexed gain of $750 and an unindexed gain of $250. As before, indexing increases her gain by $500. Also as in Example 11, Diva sells her long position for $4,750 at the same time she closes out the short sale. After indexing her basis for the additional year, Diva has an indexed gain of $3,650 on the sale of the stock.\(^{166}\) If Diva were not permitted to index the long position while she was also in a short position, her gain would have been $3,750.\(^{167}\) Therefore, indexing for the last year decreases her gain by only $100.

Combining the two transactions, with indexing, Diva would have net income of $4,400.\(^ {168}\) Without indexing during the short sale period, Diva would have net income of $4,000.\(^ {169}\)

Thus, as shown by Example 12, suspending indexation when there is a short sale against the box may lead to a small reduction in administrative costs, but it generally will lead to an incorrect computation of gain or loss.

I. Forward Contracts

In a typical forward contract, the forward purchaser agrees to purchase a specified quantity of property for a specified price (the “forward price”) at a specified time in the future from the forward seller. Generally, payment is made at the time of delivery. In a cash-settlement forward contract, in lieu of delivery of the property, a cash payment is made based on the difference between the forward price and the actual market price (the “spot price”) at the time when delivery otherwise would be made.

\(^{166}\) $3,650 = $4,750 - ($1,000 \times 1.10).
\(^{167}\) $3,750 = $4,750 - $1,000.
\(^{168}\) $4,400 = $750 + $3,650.
\(^{169}\) $4,000 = $250 + $3,750.
Example 13: Assume that University knows that it will need to purchase one million gallons of #2 home heating oil in a year. University could fix the cost of its oil purchase by entering into a one-year forward contract to purchase the oil. Alternatively, University could fix the cost of its oil purchase by entering into a one-year cash-settlement forward contract for #2 home heating oil and purchasing the actual oil on the spot market. Under the contract, the seller of the contract would agree to pay University the excess, if any, of the spot price of oil one year hence over the contract price, multiplied by one million gallons. In turn, University would agree to pay the seller of the contract the excess, if any, of the contract price over the spot price multiplied by one million gallons.

Clearly, the forward price and the actual value at maturity of the forward contracts in Example 13 are dependent on, among other variables, the expected and actual rates of inflation, respectively. Despite the interrelationship, however, between the profit (or loss) on the contracts and the rate of inflation, no indexing is required. Indexing is not required because, as in the case of wage income, the parties have no investment or basis (either positive or negative) in the contract.170 As a result, their economic income from the contract is properly measured in current dollars at the time of payment. It is only where there has been a prior investment or payment that inflation produces a mis-measurement of economic income. If, in the above example, University had made a prepayment towards its obligation under the forward contract, its prepayment would need to be indexed in order to properly compute its gain or loss on the contract.171

J. Notional Principal Contracts

Notional principal contracts need to be indexed any time amounts are accounted for at a time other than when they are paid or received. For example, if a taxpayer purchases a interest rate cap, the premium for the cap must be accounted for over the life of the cap.172 In order

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170 See Section V (discussing wages).
171 See note 131 (discussing prepayments).
172 See generally Reg. § 1.446-3 (taxation of notional principal products). An interest rate cap is an agreement to make periodic payments equal to a specified notional principal amount times the excess, if any, of the level of an interest rate index over a specified rate. See Reg. § 1.446-3(f)(4)(ex. 1) (providing an example of an interest rate cap).
to properly account for the cap premium, the premium must be indexed both by the purchaser and writer of the cap agreement. 173

Assuming full-scale indexation, indexing notional principal products would be straightforward. Greater difficulties would arise if Congress were to decide to index capital assets, but not debt. In such a circumstance, it might be difficult to decide whether a particular notional principal contract was more like an asset or a debt instrument.

K. Assets Taxed on a Full Accrual Basis

In certain circumstances, taxpayers are required or permitted to account currently for gains and losses on assets without regard to a realization event. 174 Thus, for example, § 1256 requires taxpayers to accrue currently gains and losses on a mark-to-market basis on so-called § 1256 contracts, including certain futures contracts, foreign currency contracts and options. 175 Under a mark-to-market system, a taxpayer is treated as if he sold the property for its fair market value as of the end of the taxable year and immediately repurchased the property for the same price. Therefore, the deemed amount realized in each year becomes the deemed basis for the computation of gain in the following year. In general, proper inflation accounting requires that, as of the end of the first year, the taxpayer's cost basis be indexed for the inflation that occurred since the purchase date. Additionally, as of the end of each subsequent year, the taxpayer's basis from the deemed purchase as of the beginning of the year must be indexed for the inflation that has occurred in the intervening year.

Example 14: On July 1, 1990, Alec purchases for $1,000 an asset required to be taxed on a mark-to-market basis. The asset is worth $1,100 on December 31, 1990, $1,300 on December 31, 1991, and $1,400 on June 30, 1992, at which time Alec closes out the contract. Assume that there has been 5% inflation during the first half year, 10% inflation during the next full year and 5% inflation during the last half year.

Absent indexing, Alec would have taxable income of $100 the first year, equal to the difference between the fair market value of the asset at the end of the taxable year and his

173 Similarly, any amount paid for an off-market swap must be indexed. See Reg. § 1.446-3(l)(4) (Ex. 5) (providing an example of an off-market swap). See the discussion of partial indexing in Section IX. For a discussion of notional principal products and their taxation, see Shuldiner, note 79, at 247-83.
174 See note 70 (discussing various provisions requiring or permitting full accrual taxation).
175 IRC § 1256.
$1,000 purchase price. With indexing, Alec would have taxable income of only $50, because his basis would be indexed for the one-half year that he held the contract.\textsuperscript{176} In both cases, Alec’s basis in the asset would be increased to $1,100.

For the second year, without indexing, Alec would have income of $200, equal to the difference between the asset’s end of year fair market value of $1,300 and his new basis of $1,100. With indexing, Alec would have income of $90, equal to the difference between the fair market value of the asset and his basis indexed for an additional year.\textsuperscript{177} In both cases, Alec’s basis in the asset would be increased to $1,300, the asset’s fair market value.

Upon disposition, Alec would have an additional $100 of gain without indexing and $35 with indexing.\textsuperscript{178}

While the previous example demonstrates how indexing would work in general for assets that are taxed on a full accrual basis, there are additional problems raised by a broad category of transactions subject to § 1256, so-called regulated futures contracts.\textsuperscript{179} A regulated futures contract is defined as a contract traded under a system where gains and losses on the contract are paid on a daily basis.\textsuperscript{180} In general, since regulated futures contracts are entered into at current market prices and all gains and losses are paid currently, a party to a regulated futures contract has no basis in the contract and no indexing is required. The following example illustrates the lack of basis in a regulated futures contract.

**Example 15:** On November 1, 1994, Emily enters into a regulated futures contract to buy 1,000 ounces of silver on March 1, 1995 at the then market futures price of $4 per ounce. Because the contract is priced at market, Emily pays nothing to enter into the contract and, as a result, has no basis in the contract.\textsuperscript{181}

On November 15, 1994, the futures price for March silver increases to $4.10 per ounce. Under the rules of the exchange, Emily’s account is credited with $100, 1,000 times

\textsuperscript{176} $50 = $1,100 - ($1,000 \times 1.05).
\textsuperscript{177} $90 = $1,300 - ($1,100 \times 1.10).
\textsuperscript{178} $35 = $1,400 - ($1,300 \times 1.05).
\textsuperscript{179} IRC § 1256(a) applies to “section 1256 contracts,” defined to include regulated futures contracts. IRC § 1256(b).
\textsuperscript{180} IRC § 1256(g).
\textsuperscript{181} Emily may have to make a deposit with her broker to guarantee her obligations under the contract. Any such deposit would raise separate indexing issues.
the increase in the per-ounce price of silver. Assume the price of March silver remains at $4.10 through January 15, 1995, at which time Emily closes out the contract.

Under § 1256, Emily would be treated as if she sold her contract for $100, its fair market value on December 31, 1994. Emily's initial basis in the contract would be zero, the amount she paid for the contract. Since her basis is zero, no indexing is required and she would be properly taxable on her gain of $100. In addition, since Emily already has received payment of her $100 gain, she would still have a zero basis in the contract even after she has recognized gain.

On January 15, 1995, Emily would have no amount realized of zero and a basis of zero and would have no further gain or loss on the contract.182

L. Transferred and Exchanged Basis Transactions

In certain nonrecognition transactions, a person acquiring an asset generally receives a transferred basis, that is a basis equal to the basis of the transferor of the asset. In general, the recipient of an asset in a transferred basis transaction should have a basis equal to the indexed basis of the transferor. For example, the recipient of a gift generally has a basis equal to the donor's basis in the gift.183 Thus, the recipient of a gift should take a basis equal to the basis of the donor, indexed for the period between the donor's acquisition of the asset and the date of the gift.

In other nonrecognition transactions, the acquiror of property is given an exchanged basis, that is, a basis equal to the basis of property

182 Although a party to a regulated futures contract has no basis, she does have, for example, income throughout the period over which she was a party to the contract. In theory, it might be desirable to index her income so that her tax is paid in dollars that have the same value as the dollars in which she received or paid her income. Thus, in the example in the text, Emily receives $100 on November 15, but does not take it into taxable income until December 31 and does not pay tax on it until some later date. This problem, however, is no different from the problem of a person who receives wages during the year and pays taxes on the wages at some later point. Absent high levels of inflation, it is not worth indexing income in this fashion. See note 195.

183 IRC § 1015. If, at the time of the transfer, the transferor's basis in the property exceeds the property's fair market value, then for purposes of determining loss, the basis is the fair market value. Under indexation, the indexed carryover basis first would be compared with the fair market value of the property to determine whether there is unrealized real loss at the time of the transfer. If there were unrealized loss, the transferee would have a basis for loss purposes equal to the fair market value of the property and a basis for gain equal to the indexed carryover basis. Both the basis for loss and the basis for gain subsequently would be indexed for any future inflation.
given up in an exchange. In general, the acquirer of an asset in an exchanged basis transaction should have a basis equal to the indexed basis in the original asset. Thus, for example, in a like kind exchange, the taxpayer's basis in the new property should be equal to his basis in the old property indexed for the period beginning on the date he acquired the old property and ending on the date of the exchange. 184

With both transferred and exchanged basis transactions, it generally would be equally correct to give the acquiror of the new asset a basis equal to the original unindexed basis, but with a tacked-on holding period. The optimal rule depends on the precise administrative details of the indexing scheme adopted. The following example illustrates the equivalence of the two rules:

Example 16: Quentin acquires an asset for $100 in 1990. In 2000, Quentin gives the asset to Bly. Bly sells the asset in 2005. Assume there has been 5% inflation throughout. Under current law, Bly has a transferred basis.

Alternative 1: Bly would be treated as having received an asset with an indexed basis. Therefore, as of 2000, her basis would be $259, determined by indexing Quentin's cost basis for the 10 years that Quentin held the asset. 185 At the time of sale, Bly would index her $259 basis for the additional five years that she held the asset and accordingly, would have a basis of $418 at the time of sale. 186

Alternative 2: Bly would be treated as having received an asset with an unindexed basis, but her holding period would be deemed to have begun when Quentin acquired the asset. Under this approach, her basis at the time of sale also would be $418. 187

M. Cash.

In theory, cash should be indexed in the same manner as any other asset. Assuming 10% inflation, if a taxpayer receives $100 cash on June 1, 1994 and uses the cash to make a purchase on June 1, 1995, the taxpayer, in effect, has suffered a loss because the cost of the cash,

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184 More precisely, the taxpayer's basis in the new property would be the indexed basis of the property exchanged, decreased in the amount of any money received by the taxpayer and increased in the amount of gain or decreased in the amount of loss to the taxpayer that was recognized on the exchange. IRC § 1031(d). The gain or loss recognized on the exchange would be determined after indexation.
185 $259 = $100 \times 1.10^{10}.
186 $418 = $259 \times 1.10^5.
187 $418 = $100 \times 1.10^{15}.$
when measured in 1995 dollars, was $110. In essence, cash should be treated simply as a form of property and indexed accordingly. Given the administrative difficulty of tracking and indexing cash holdings, it would be undesirable to index cash, absent extreme rates of inflation. Additionally, as inflation rates rise, taxpayers can protect themselves against inflationary losses from holding cash by reducing their cash balances.

V. INDEXING WAGES

Wages and other compensation for services present perhaps the clearest example of a type of income for which no indexing is necessary. To see that no indexing is required for wages, consider a simple example:

Example 17: In 1993, Emily has taxable wages of $100,000. Assuming a tax rate of 33%, Emily's tax liability is $33,000. Over the following year, all prices (including wages) increase by 10%. In 1994, therefore, Emily has taxable wages of $110,000 and a tax liability of $36,300.

As a result of inflation, Emily's tax liability increased by $3,300 or 10%. Emily, however, is no worse off and the fisc is no better off than before the inflationary increases in prices because $1.10 paid in 1994 has the same real value as $1.00 paid in 1993. In real terms, measured in constant 1993 dollars, Emily's liability has stayed constant at $33,000. (Alternatively, measured in 1994 dollars, Emily's liability has stayed constant at $36,300.) The proper test of Emily's real tax liability is the amount of goods and services that Emily has had to forgo in each year to satisfy her tax liability. By definition, $33,000 would have bought the same amount of goods and services in 1993 as $36,300 will buy in 1994. Therefore, her real tax liability has been unaffected by inflation.

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188 $110 = $100 \times 1.10.
189 Although it may seem perverse to treat cash as property, that is precisely the general rule with foreign currency. See generally IRC § 988; Reg. § 1.988-0 to -5. But see Reg. § 1.988-1(a)(9) (removing foreign currency held for personal purposes from the application of § 988).
190 Assuming that bank deposits were indexed, taxpayers could receive the protection of indexation by holding their cash as bank deposits. Also, depending on the details of implementation, cash balances held by entities are effectively indexed to the owner of the entity. For example, if a taxpayer transferred $100 in cash to a wholly-owned corporation, the taxpayer would receive the benefit of indexation on the $100 through the increase in his indexable basis in the stock of the corporation.
191 The example assumes that the tax structure has been fully indexed.
In general, therefore, wages require no indexing because the measurement of income from wages, as well as the resulting tax liability, is measured only in terms of current period dollars. It is only where the current determination of income is based on dollar values from previous periods that indexing is required to measure income accurately.\footnote{If taxpayers were permitted to capitalize and amortize investments in human capital, they in essence would have a basis in wages and indexation would be necessary.}

Moreover, the conclusion that indexing is unnecessary generally holds for deferred compensation as well as compensation that is paid when earned. In general, when an individual is paid deferred compensation, the entire amount of deferred compensation is included in income only when received.\footnote{Individuals generally are not taxable on deferred compensation paid through a qualified pension plan. See generally IRC § 401 (defining a qualified trust); IRC §§ 402, 403 (providing generally that beneficiaries of qualified deferred compensation arrangements are taxable upon receipt of the deferred compensation); IRC § 408 (providing rules for individual retirement accounts). Generally, in the case of deferred compensation through a nonqualified trust, individuals are taxable at the time contributions are made to the trust or, if later, when the contributions vest. See IRC §§ 402(b), 83. In such cases, indexing would be necessary.} In other words, the individual has no basis in the deferred compensation. As a result, the computation of income and the resulting tax liability is based on entirely what are current-period dollars when paid and indexing is unnecessary.

\textit{Example 18:} In addition to her current compensation, Emily’s employer agrees to pay her $30,000 in 1996 for the work she performed in 1993. In 1993, Emily’s employer deposits into a qualified trust an amount sufficient to fund the $30,000. In 1996, Emily is paid $30,000 from the trust. Emily’s income for 1996 would include the full $30,000 deferred compensation payment without any basis offset. Since the entire computation of income in 1996 is based on an amount paid in 1996, there is no need to adjust for inflation.

Although the amount of inflation between 1993 and 1996 would be relevant for determining the value of the payment expressed in 1993 dollars, Emily’s tax liability in 1996 is measured properly based on the value of the payment in 1996 dollars.

Even in the case of wages, certain simplifying assumptions have to be made. Wages for any taxable year generally are received over time. Therefore, strictly speaking, it is not correct simply to add the total wages for the year without adjusting for the time of each payment. Similarly, taxes on the wages are paid over time. To a significant extent, however, these two factors cancel out because of wage
Thus, for example, if a taxpayer is paid weekly and the resulting tax liability is withheld contemporaneously, the two effects offset each other exactly. In any event, as long as inflation rates are relatively low, the effect of this type of mistiming is relatively insignificant and generally can be ignored. 195

VI. INDEXING RENTS

In general, rent involves only a current payment of income (or expense) that is properly measured in current dollars. Thus, there is no need to make an indexing adjustment. In other words, rent (the current payment for the use of physical capital) should be treated in the same way as wages (the current payment for the use of human capital). 196 The fact that it is unnecessary to index rent is not always clearly understood. To see more clearly that no adjustment for inflation generally is required, consider a simple case of a lease where the rent is reset each year to the current market rate. Each year the lessee pays for the current rental value of the property. Although the rent is measured each year in inflated dollars, the corresponding tax effects also are measured in equally inflated dollars and there is no need to

194 IRC §§ 3401-3406 (providing, inter alia, for mandatory wage withholding); IRC § 31 (providing a refundable tax credit for withholding). A similar relationship exists between self-employed income and estimated taxes. IRC § 6654 (providing penalties for failure to pay quarterly estimated taxes); IRC § 6315 (treating payments of estimated taxes as payments on account of income taxes).

195 In a hyperinflationary economy, even the shortest lag between receipt of income and payment of tax can be critical. To take an extreme example, for the period 1989-90, Peru had inflation of 7,650%. Central Intelligence Agency, The World Factbook 249 (1991). At such a rate of inflation, a one-month delay between the receipt of wages and the payment of taxes would reduce the effective tax rate by over 40%. More recently, the former Yugoslavia reported an annual inflation rate of almost 200 billion percent. Barbara Demick, Yugoslavia Benumbed by 12-Digit Inflation, Philadelphia Inquirer, Dec. 20, 1993, at A1.

One circumstance where it may be inappropriate to ignore the time gap between the earning of taxable income and the payment of taxes is where a firm has a net operating loss. In general, a firm with a net operating loss is permitted to carry the loss back for up to three years and forward for up to 15 years. IRC § 172. Thus, a firm may be deducting a cost in one year that actually was paid 15 years earlier. At a 5% inflation rate, the cost will have lost about one-half of its value. The solution is to index net operating loss carrybacks and carryforwards. Under indexation, a net operating loss carried back would be reduced by dividing the amount by the appropriate indexation factor to reflect the greater value of the dollar in the earlier year. A net operating loss carried forward would be increased by the appropriate indexation factor to reflect the lesser value of the dollar in the future year. Of course, net operating losses that are carried forward also lose value because of the real discount rate. In general, similar considerations apply to any provision that permits carryforwards or carrybacks. See, e.g., IRC § 39 (business credits); IRC § 53 (alternative minimum tax credit); IRC § 465 (at-risk rules); IRC § 469 (passive losses); IRC § 904(c) (foreign credit); IRC § 1212 (capital losses).

196 See Section V (demonstrating that wages do not require indexation). Although this Section refers to rent and the use of physical capital, the discussion applies with equal force to royalties and other payments for the use of intangible capital.
make any type of indexing adjustment. The essential fact is that all computations are made in current dollars.\(^{197}\)

One source of confusion with rents is that in a competitive market in long-run equilibrium, rents are equal to the interest cost of carrying the property plus depreciation.\(^{198}\) Given that it is necessary to index both depreciation and interest,\(^{199}\) it seems logical that it would be similarly necessary to index rent. The apparent logic is, however, deceptive. Consider first the rent on nondepreciable land in the absence of inflation with no carrying costs other than interest. Assume that a lessor owns land worth $1,000 and the real (and nominal) interest rate is 4%. The cost of carrying the land for one year is 4% and, therefore, the market rent would be $40. Now assume that there is also 6% inflation and that the nominal interest rate is 10%.\(^{200}\) Unlike the case of a lender whose principal is repaid in nominal currency and needs to charge sufficient interest to cover the loss of real principal, the lessor’s “principal” is repaid in real goods, the land, and there is no need to add an inflation component to the rent.\(^{201}\) Thus, despite the presence of inflation and the higher nominal interest rate, the rent on the land should remain unchanged at $40 for the year. In the second year, the rent increases by 6% to $42.40 to reflect the increased nominal value.

\(^{197}\) The discussion in the text ignores differences between the time that the rent accrues during the year, the time payment is made and the time that taxes are paid. Thus, for example, if rent is received on July 15 and the resulting tax liability is paid on the following April 15, the taxpayer has the privilege of paying taxes in reduced dollars as well as benefiting from the real interest savings on the deferral. This timing problem arises throughout the tax law and largely is dealt with by the estimated tax provisions. See note 194.

\(^{198}\) See, e.g., Robert E. Hall, Tax Treatment of Depreciation, Capital Gains, and Interest in an Inflationary Economy, in Depreciation, Inflation, and the Taxation of Income from Capital 149 (Charles R. Hulten ed., 1981) [hereinafter Depreciation and Inflation] (showing that absent tax distortions, the rental price of capital goods is the real interest rate plus real depreciation); David F. Bradford & Don Fullerton, Pitfalls in the Construction and Use of Effective Tax Rates, in Depreciation and Inflation, supra, at 251; Dale W. Jorgenson & Martin A. Sullivan, Inflation and Corporate Capital Recovery, in Depreciation and Inflation, supra, at 171. Market rents also would include any other carrying costs of the property, such as insurance and maintenance. The real interest rate is the nominal interest rate minus the rate of inflation. The nominal interest cost is computed by reference to the value of the property, not by the amount of debt secured by the property. If the property is fully debt financed, the nominal interest cost is the actual nominal interest paid. To the extent that the property is not fully debt financed, the nominal interest cost represents the opportunity cost of continuing to hold onto the property, rather than selling the property and investing the proceeds at the market rate of interest.

\(^{199}\) See Sections VII, IX.

\(^{200}\) The assumption that the nominal interest rate would rise just by the amount of inflation is equivalent to the assumption that the Fisher rule holds. See note 226.

\(^{201}\) If the land is fully debt financed, the lessor has a net cash outflow of $60 ($100 interest expense minus $40 rental income), but is compensated by the $60 increase in the nominal value of the land (or, equivalently, by the decrease in the real value of her obligation to repay the principal on the debt).
of the land. The increased rent, however, like the nominal increase in an individual's wages, is properly measured in current dollars and continues to require no inflation adjustment.

The example is more complicated where the property depreciates, but the essential elements are the same. The lessor needs to be compensated for the real cost of owning the property, which includes the real depreciation and the real interest cost. In nominal terms, these costs may increase with inflation, but the resulting rent is stated correctly in current dollars. Of course, the fact that depreciation and interest are not indexed properly means that there may be tax-induced distortions in the pricing of rent, but adjusting the rent deduction seems a very indirect way of compensating for the mistaxation of depreciation and interest. Moreover, in an otherwise fully indexed world, the taxation of interest and depreciation already would be corrected for inflation and no further adjustment would be appropriate for rent.

The apparent discrepancy between the need to index debt (a loan of money) without the corresponding need to index a lease (a loan of property) follows from the differences between the fundamental accounting rules adopted for leases and debts. In particular, the key difference between a borrower and a lessee is that the borrower is treated as the owner of the proceeds of the loan while a lessee is not treated as the owner of the underlying property. Thus, the borrower is treated as having basis in the loan proceeds (and any property purchased with such proceeds) while the lessee is not. This ownership interest and the resulting basis produce the need for indexing. Similarly, the lessor is treated as the owner of the underlying property, but not generally as the owner of a separate leasehold interest. Accordingly, there generally is no need to keep track of basis in the lease and, therefore, no opportunity to mismeasure basis in current dollars.

202 The nominal value of the land increases from $1,000 to $1,060. $42.40 = 4% \times $1,060.

203 In the absence of indexation, the lessor's interest deduction is overstated and the lessor's depreciation deduction is understated. It is, therefore, difficult to predict the overall effect on the market price of rents.

204 See, e.g., Hort v. Commissioner, 313 U.S. 28 (1941) (refusing to permit taxpayer to allocate basis to a payment in lieu of rent).

205 There are a variety of tax consequences that flow from the difference between a lease and a loan. For example, if at the end of the term of a lease, the lessee returns property whose value has diminished, the lessee has no corresponding income.

Another difference between a lease and a loan is that the parties' choice of timing on a lease is given substantially more deference than on a loan. Compare IRC § 467 (rent leveling in certain limited circumstances) with IRC §§ 1272-1288 (original issue discount and related provisions). Professor George Mundstock has proposed removing the distinction between leases and loans by treating the lessee as an owner of the underlying property and
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While generally neither a lessor nor a lessee has a basis in its leasehold interest, there are numerous exceptions. In such cases, there may be a need to make appropriate adjustments for inflation. For example, if a taxpayer purchases a leasehold interest, the interest generally is treated as an intangible asset and the lessor/purchaser is permitted to amortize her basis. Under such circumstances, the amortization deductions should be indexed.

The preceding discussion is based on the assumption that the parties to the leasing agreement have allocated the rent over the term of the lease properly. By this I mean that the rent payable for each period is the arm's length rent for the period and not a deferred payment for an earlier period or a prepayment for a later period. In other words, the discussion assumes that all payments are current in an economic as well as a legal sense. Unfortunately, even where a lease is an arm's length transaction, there is no guarantee that the parties have allocated the rental payments over the term of the lease properly. A lease essentially is an agreement by the lessor to permit the lessee use of property in exchange for a stream of payments. As an economic matter, the parties generally are indifferent between different payment streams with equal present values. Thus, for example, assume that the properly allocated rents for Blackacre are $1,000 per year. Given a 10% discount rate, the parties to a five-year lease would generally be indifferent between paying $1,000 per year, $3,791 at the commencement of the lease (a prepaid lease), or $6,105 at the termination of the lease (a deferred lease). As an economic matter, a prepaid lease is essentially a lease combined with an implicit loan from the

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206 See IRC § 167 (generally permitting amortization of depreciable assets); Reg. § 1.167(a)-3 (clarifying that intangible assets are subject to depreciation); IRC § 178 (providing rules for determining the depreciable life of leasehold interests). In some circumstances, a lessor who also owns the remainder interest in the property is permitted to separately allocate basis to the leasehold. Compare Friend v. Commissioner, 119 F.2d 959 (7th Cir. 1941) (permitting owner of both the leasehold and residual interest in property subject to a lease to separately allocate basis to the leasehold interest) with Moore v. Commissioner, 207 F.2d 265 (9th Cir. 1953) (prohibiting separate allocation of basis to leasehold interest by owner of residual interest).

207 See Section VII (discussing indexing depreciation).

208 The parties may not be indifferent as a tax matter. In addition, the appropriate discount rate is a function of risk, which in turn is a function of the timing of payments relative to the timing of the use of the property. For example, when payments for any period are made after the period in question, the lessor loses any ability to restrict the lessee's use of the property for failure to make payment.
lessee to the lessor and a deferred lease is a lease combined with an implicit loan from the lessor to the lessee.

Without regard to inflation, the failure to distinguish between deductible rental payments and nondeductible principal on loans presents opportunities for tax avoidance.\textsuperscript{209} Congress responded to the problem of implicit loans in rental agreements by enacting § 467.\textsuperscript{210} In general, under § 467, payments under rental agreements that are made before or after the period to which the rents are properly allocable are treated as loans and interest is imputed.\textsuperscript{211} Once a

\textsuperscript{209} See generally Mundstock, note 205, at 755.

\textsuperscript{210} The problem of implicit loans arising from prepayments and deferred payments arises in almost any economic transaction. See, e.g., IRC §§ 483, 1274 (imputing interest with respect to deferred payments for property); IRC §§ 1272, 1273 (imputing interest with respect to deferred payments in a lending transaction); IRC § 467(g) (providing regulatory authority to impute interest with respect to deferred payments for services); Reg. § 1.446-3(g)(4) (imputing interest with respect to prepayments in certain notional principal contracts). For a discussion of the appropriate treatment of prepayments and deferred payments, see generally Halperin, note 131; Scarborough, Payments, note 131; Shuldiner, General Approach, note 79.

\textsuperscript{211} IRC § 467(a)(2). Strictly speaking, the statute only imputes interest when rent is deferred. Section 467(f), however, provides regulatory authority to promulgate comparable rules for prepaid rent.

It is not sufficient to provide that interest will be imputed any time that a payment is deferred or accelerated without also providing a standard against which to determine when the payment should have been made. Thus, for example, the original issue discount rules adopt the constant yield assumption as such a framework. See Joseph Bankman & William A. Klein, Accurate Taxation of Long-Term Debt: Taking into Account the Term Structure of Interest, 44 Tax L. Rev. 335, 338 (1989); Shuldiner, General Approach, note 79, at 267-68; Theodore S. Sims, Long-Term Debt, the Term Structure of Interest and the Case for Accrual Taxation, 47 Tax L. Rev. 313, 316-17 (1992). Section 467 takes two different approaches to the allocation problem. In what are perceived to be nonabuse cases, § 467 respects the parties’ allocation of rents and merely puts both parties on the accrual basis and imputes interest when rental payments are deferred relative to the period to which they are allocated. IRC § 467(a), (b)(1). In abuse cases, § 467 rejects the parties’ allocation of rents and adopts the assumption that rents should accrue ratably over the term of the lease (“level rents”). IRC § 467(b)(2). A rental agreement is deemed to be abusive if 1) it provides for nonlevel rents that do not meet certain safe harbors 2) the agreement is part of a sale-leaseback transaction or for a term exceeding 75% of the statutory recovery period of the property; and 3) a principal purpose for providing nonlevel rents is the avoidance of taxes. IRC § 467(b)(3)-(5).

Unfortunately, the level rent assumption is even less well-founded in economic reality than is the constant yield assumption in the case of interest. In real terms, generally rent would be level only in the case of property that was expected to maintain a constant value over time. Thus, for example, the level rent assumption might be appropriate for certain real estate, while it would clearly be inappropriate for equipment rentals where the fair market rental would be expected to decline over time as the equipment depreciates. In the presence of inflation, rent leveling would only be correct in the case of property whose real fair market rental was declining each year at a rate equal to the rate of inflation. Perhaps coincidentally, the level rent assumption may be reasonably accurate for depreciable property at moderate rates of inflation. Thus, without inflation or at very low rates of inflation, it generally would be appropriate to adopt a declining rent assumption for equipment and a level rent assumption for real property; at moderate rates of inflation, it generally may be
rental agreement is accounted for as a loan, however, the problem of inflation reappears. In particular, it becomes necessary to index the implicit loan. 212

VII. INDEXING DEPRECIABLE PROPERTY

A. In General

As with any other asset purchased in one period and accounted for in another period, depreciable property must be indexed for inflation in order to measure income properly. 213 The effect of failing to index depreciation can be seen by comparing two simple examples, one without inflation and the other with moderate inflation.

Example 19: David purchases a machine that without additional costs produces one widget a year for two years. The widgets can be sold immediately and costlessly for $100. Given the prevailing interest rate of 5%, David pays $186 for the machine. 214 Once the machine has produced its first widget, its value falls to $95, reflecting the fact that it is now expected to generate $100 in one year. 215 The machine, therefore, depreciates $91 in its first year. Once the machine has produced its second widget it becomes worthless, deprecating an additional $95.

For his first year of operation, David reports gross income of $100 from the sale of the widget, takes a depreciation deduc-
tion of $91, and has taxable income of $9. For his second year of operation, David reports gross income of $100, depreciation of $95 and taxable income of $5.

Example 20 shows the effect of moderate inflation on Example 19:

Example 20: Assume the same facts as in Example 19 except that there is 5% inflation between the first and second year. Thus, the second widget is sold for $105, rather than $100.

For his first year of operation, David again reports gross income of $100, depreciation of $91, and taxable income of $9. In the second year of operation, given the change in the price level, David reports gross income of $105 from the sale of widgets. Assuming that David is still permitted an unindexed depreciation deduction of $95, David's taxable income is $10.

Thus, in Example 20, a modest 5% inflation causes a 100% increase in taxable income, showing that the failure to index depreciation can have dramatic effects on the taxation of business profits.

A preliminary question in indexing depreciable assets is whether the adjustment should be made annually or only upon final disposition of the asset.216 Given the general assumption that the nominal income generated by a depreciable asset is included in income currently, it is appropriate for the indexation adjustment also to be made currently.217

Once the decision has been made to index currently, there are a variety of equivalent techniques that can be used to compute the amount of indexed depreciation. Economic depreciation is the de-

216 See text accompanying notes 102-09 for a general discussion of timing indexing adjustments.
217 Depreciation generally is permitted on a current basis because it is presumed that the income from the asset also is taxed on a current basis; therefore, a current deduction is necessary to match income and expense properly. IRC § 167 (permitting a current deduction for depreciation); Commissioner v. Idaho Power Co., 418 U.S. 1, 11 (1974) ("When the asset [being depreciated] is used to further the taxpayer's day-to-day business operations, the periods of benefit usually correlate with the production of income. Thus, to the extent that equipment is used in such operations, a current depreciation deduction is an appropriate offset to gross income currently produced."). When the income from the asset is deferred, depreciation generally is deferred. See IRC § 263A (generally requiring capitalization of expenses, including depreciation, incurred in the production or resale of property); Idaho Power, 418 U.S. 1 (holding that depreciation on equipment used in construction must be capitalized into the basis of the constructed property). Permitting a current deduction for economic depreciation has the effect of making an income tax neutral with respect to choice among asset lives. Paul A. Samuelson, Tax Deductibility of Economic Depreciation to Insure Invariant Valuations, 72 J. Pol. Econ. 604 (1964).
cline in the real value of the asset over the taxable period.\textsuperscript{218} In the absence of inflation, depreciation, therefore, is equal to the difference between the value of the property at the beginning and end of the period. In the presence of inflation, it is necessary to measure the decline in value in constant dollars. Thus, stated in terms of end-of-period dollars, depreciation for the period is equal to the value at the beginning of the period, adjusted upwards for inflation, minus the value at the end of the period.

\textit{Example 21:} Emily purchases an asset for $1,000 to use in her business. The asset depreciates in real terms at the rate of 30\% per year. In the absence of inflation, the asset would be worth $700 at the end of the first year. Accordingly, Emily should be entitled to a depreciation deduction of $300 for the first year.

Assuming 10\% inflation, however, at the end of the first year, the asset would be worth $770. Emily's indexed basis for the asset, however, would be $1,100. Accordingly, Emily should be entitled to a depreciation deduction of $330. Her remaining indexed basis in the asset should be $770.

Equivalently, depreciation could be indexed simply by first indexing the taxpayer's basis and then multiplying the taxpayer's indexed basis by the depreciation rate.

\textit{Example 22:} In the absence of inflation, Emily's depreciation deduction in Example 21 could be determined by multiplying Emily's basis, $1,000, by the depreciation rate, 30\%. Thus, Emily would be entitled to $300 of depreciation.

With 10\% inflation, Emily's depreciation deduction could be determined by multiplying Emily's indexed basis, $1,100, by the real depreciation rate, 30\%. Thus, Emily would be entitled to $330 of depreciation. Her remaining basis of $770 would be determined by subtracting her indexed depreciation from her indexed basis.\textsuperscript{219}

\textsuperscript{218} See, e.g., Graetz, note 44, at 391. See text following note 220 for a discussion of accelerated depreciation.

\textsuperscript{219} As a third alternative, depreciation could be indexed by permitting the taxpayer to multiply the otherwise allowable depreciation deduction by an indexing factor. The factor would be equal to the inflation index at the time the deduction was permitted divided by the inflation index at the time the property was purchased. Note that generally the appropriate starting point for purposes of computing the inflation adjustment would be the time that the property was purchased, not the time that the property was placed in service.
The marginal information and other administrative costs of indexing depreciation would be small because computing depreciation deductions under current law already requires keeping careful track of the basis of assets.

B. Accelerated Depreciation

An argument against indexing depreciation is that accelerated depreciation provides a simpler and adequate substitute to indexed depreciation.\textsuperscript{220} Table 5 demonstrates the relationship between accelerated depreciation and indexed real depreciation using a hypothetical $1,000 asset that is assumed to depreciate in real terms on a straight-line basis.\textsuperscript{221}

\begin{table}[h]
\centering
\caption{Comparison of indexed and accelerated depreciation}
\begin{tabular}{|c|c|c|c|c|c|c|}
\hline
Year & Indexed Economic Depreciation & Economic Depreciation & 2\% Inflation & 5\% Inflation & 10\% Inflation & Accelerated Depreciation & One-Shot Depreciation \\
\hline
1 & $200 & $200 & $200 & $200 & $375 & $909 \\
2 & 200 & 204 & 210 & 220 & 325 & 0 \\
3 & 200 & 208 & 221 & 242 & 200 & 0 \\
4 & 200 & 212 & 232 & 266 & 100 & 0 \\
5 & 200 & 216 & 243 & 293 & 0 & 0 \\
\hline
Total & 1,000 & 1,041 & 1,105 & 1,221 & 1,000 & 909 \\
PV-7\% & 876 & 909 & 909 & 909 & 909 & 909 \\
PV-10\% & 831 & 909 & 909 & 909 & 909 & 909 \\
PV-15\% & 765 & 909 & 909 & 909 & 909 & 909 \\
\hline
\end{tabular}
\end{table}


\textsuperscript{221} For ease of exposition, I assume that each year’s depreciation deduction is taken at the beginning of the year. The straight-line assumption is adopted for convenience; exponential depreciation generally is considered a more realistic assumption. See Charles R. Hulten & Frank C. Wykoff, The Measurement of Economic Depreciation, in Depreciation and Inflation, note 198, at 93 (econometric study showing that depreciation tends to be exponential).
Column B shows the economic depreciation for the asset measured in constant dollars. Column D shows the depreciation that would be permitted under indexed economic depreciation with 5% inflation. As can be seen in Column D, each year the depreciation deduction is increased by the inflation rate to reflect the declining real value of the dollar. At the bottom of each column is the total amount of depreciation permitted over the life of the asset and the present discounted value of the depreciation allowances using various discount rates. In particular, note that the row labeled “PV-10%” shows that the present value of indexed depreciation under 5% inflation and an assumed real interest rate of 5% would be $909.222

As an alternative to indexed depreciation, consider the hypothetical accelerated depreciation schedule shown in Column F.223 As shown in the table, the present value of the accelerated depreciation, at the 10% discount rate, is $909, exactly equal to the present value of the indexed depreciation in Column D. Thus, the example in Table 5 demonstrates that an accelerated depreciation schedule can be chosen to be equivalent in present value terms to indexed economic depreciation.224

There are, however, a variety of problems with using accelerated depreciation in lieu of indexing.225 The primary problem is that accelerated depreciation can at best compensate for expected, not actual inflation. If, after the accelerated depreciation schedule has been set, the inflation rate changes, the two approaches lose their equivalence. Consider first an increase in the inflation rate to 10% and assume that

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222 The 10% discount rate reflects the assumed combination of 5% inflation and a 5% real interest rate. The exact discount rate used was 10.25%, reflecting annual compounding. 10.25% = [(1 + 5%) x (1 + 5%)] - 1. See Section IX for a discussion of the effect of inflation on interest rates.

223 The accelerated depreciation schedule in Table 5 was chosen arbitrarily from the infinite number of accelerated depreciation schedules that have the same present value as the indexed real depreciation. The choice of accelerated depreciation schedules is dependent on assumptions as to the expected real interest rate and the expected inflation rate. In the table, both rates are assumed to be 5%.

224 Column G in Table 5 shows the result under so-called one-shot depreciation. One-shot depreciation is described in the text at note 268.

225 See Martin Feldstein, Adjusting Depreciation in an Inflationary Economy: Indexing Versus Acceleration (National Bureau of Economic Research Working Paper No. 395, 1979) (comparing accelerated depreciation and indexed depreciation). I do not mean to suggest by the comparison between indexed real depreciation and accelerated depreciation that the use of accelerated depreciation should be seen solely as an attempt by policymakers to compensate for inflation. To the extent that accelerated depreciation is intended to act as a subsidy for capital investment, the failure to index the accelerated depreciation blunts the incentive effects. Of course, if Congress wished to provide incentives for investment in depreciable assets, it always would be possible to provide for indexed accelerated depreciation. The advantage of indexed accelerated depreciation over unindexed accelerated depreciation is that with indexation, the amount of the incentive is not dependent on the level of inflation.
the real interest rate remains constant at 5%.\textsuperscript{226} Column C shows the depreciation that would then be allowed. Note that the present value of the indexed depreciation, now computed at a 15\% discount rate (PV-15\%), remains constant at $909, while the present value of the accelerated depreciation declines to $871.\textsuperscript{227} Correspondingly, as shown in Column B, if the inflation and discount rates were to decrease to 2\% and 7\% (PV-7\%), respectively, the present value of the indexed economic depreciation would remain constant at $909 while the present value of the accelerated depreciation would increase to $934.\textsuperscript{228} As the example in Table 5 shows, accelerated depreciation designed to compensate for an expected inflation rate of 5\% would be inadequate to deal with an actual inflation rate of 10\%.\textsuperscript{229} Similarly, the accelerated depreciation would be overly generous if the inflation rate dipped to 2\%.\textsuperscript{230} Thus, at times of relatively high inflation, fixed accelerated depreciation will encourage taxpayers to under-invest in depreciable equipment, and at times of relatively low inflation fixed

\textsuperscript{226} The assumption that the real interest rate remains constant at 5\% is consistent with the strict version of the Fisher rule for interest rates. Under the strict Fisher rule, the nominal interest rate, and therefore the discount rate, increases by approximately 1\% for every 1\% increase in the inflation rate. Under the modified Fisher rule, the nominal interest rate would increase by more than 1\% for every 1\% increase in the inflation rate. See Section IX. If the modified Fisher rule is empirically correct, then the effect of inflation on the value of accelerated depreciation would be magnified.

\textsuperscript{227} The discount rate increases to 15\% to reflect the higher inflation rate. The exact discount rate used is 15.5\%: $15.5\% = \left[\frac{1 + 5\%}{1 + 10\%}\right] - 1$.

\textsuperscript{228} The discount rate decreases to 7\% to reflect the higher inflation rate. The exact discount rate used is 7.1\%: $7.1\% = \left[\frac{1 + 5\%}{1 + 2\%}\right] - 1$.


\textsuperscript{230} Changes in the inflation rate after a taxpayer invests in equipment should be distinguished from changes after Congress sets the accelerated depreciation schedule, but before the taxpayer invests. If the inflation rate changes after the taxpayer has invested in the equipment, the change will affect his effective tax rate, but generally will not affect his incentive to invest. Therefore, concern primarily should be one of equity, not efficiency. If the inflation rate changes before the taxpayer has invested, it will affect his incentive to invest, raising an efficiency concern. Of course, the risk of changes in the rate of inflation may affect the taxpayer's level of investment even if the rate has not changed between the time that Congress sets the rate and the taxpayer considers making an investment.

If the primary concern is with efficiency, an alternative to full scale indexing would be to have the Service publish new depreciation schedules each year indexed to changes in the inflation rate. Under such a system, taxpayers would bear the risk of increased or decreased inflation after they had made an investment, but the expected tax rate on investment would remain relatively stable. There are, however, a variety of serious problems with resetting depreciation annually. For example, if there were an increase in inflation and, therefore, an acceleration of depreciation schedules, taxpayers might have an incentive to churn their investments. In addition, taxpayers would have an incentive to delay or accelerate investment to take advantage of or avoid expected changes in the depreciation schedules. Finally, such a system would increase the administrative burden on taxpayers and the Service.
accelerated depreciation will encourage taxpayers to over invest in depreciable equipment.\(^\text{231}\)

Perhaps more importantly, inflation generally will cause non-neutral changes across asset lives. As a result, not only will taxpayers have the wrong incentive to invest in depreciable assets, but also given the amount of investment in depreciable assets, taxpayers will have the incentive to invest in the wrong mix of assets lives.\(^\text{232}\) The bias among asset lives not only affects the production mix within firms and sectors of the economy, but also affects the allocation of capital among production sectors.\(^\text{233}\) Overall, due to the inflation induced production inefficiency, for any given level of investment, the amount of goods and services produced will be less than could be produced with the optimal mix of investment.\(^\text{234}\)

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\(^\text{231}\) To the extent that accelerated depreciation also is intended to provide an incentive to invest in depreciable equipment, the incentive will become larger than intended at times of low inflation and will become smaller than intended, and even perhaps negative, at times of high inflation.


\(^\text{233}\) See, e.g., Don Fullerton, The Indexation of Interest, Depreciation, and Capital Gains and Tax Reform in the United States, 32 J. Pub. Econ. 25 (1987) (discussing effective total tax rates as a function of the inflation rate for structures, public utilities, land, inventories, owner-occupied housing and equipment); Feldstein & Summers, note 213, at 460-67 (estimating the effect of inflation on corporate tax liabilities by two-digit standard industry code for 1976); Mervyn A. King & Don Fullerton, The Taxation of Income from Capital 243-57 (1984) (estimating effective tax rates for various sectors as a function of inflation). Jorgenson and Yun conclude that “potential gains in welfare from the 1986 reform are largely dissipated at moderate rates of inflation, such as those that have prevailed for the past decade. Insulating the U.S. tax system from the impact of inflation should retain high priority in future deliberations about tax reform.” Jorgensen & Yun, note 229, at S191.

\(^\text{234}\) Bradford, Issues, note 232, at 17. Throughout, it must be remembered that this is a problem of the second best. Id.; see also Alan J. Auerbach, The Optimal Taxation of Heterogeneous Capital, 93 Q.J. Econ. 589 (1979). In general, given that there are multiple inefficiencies in the economy, it is not necessarily the case that welfare is improved by correcting a single inefficiency. See R.G. Lipsey & Kelvin Lancaster, The General Theory of Second Best, 24 Rev. Econ. Stud. 11 (1956). Nevertheless, it is difficult to believe that the optimal depreciation policy would change in an apparently arbitrary fashion as a function of the rate of inflation. See text following notes 243-51.
One way to see how changes in inflation have a non-neutral effect on accelerated depreciation is to look at the effect of inflation on the current accelerated depreciation provisions in the Code (MACRS). Assume that MACRS is intended to provide the equivalent of economic depreciation for each class of assets given an expected rate of inflation of 5%. As discussed above, if inflation is less than 5%, MACRS provides a subsidy relative to economic depreciation; if inflation is greater than 5%, MACRS penalizes holders of depreciable assets relative to economic depreciation. The magnitude of the inflation effect can be measured by comparing the present value of the depreciation deduction for each class of property at a given inflation rate to the present value at 5% inflation. Figure 1 shows the effect of inflation on the various MACRS classes. Consider for example the line
labeled "3-yr" that shows the effect of inflation on the present value of depreciation on three-year property relative to the present value given 5% inflation.\textsuperscript{238} If inflation falls from the target rate of 5% to 2%, Figure 1 shows that the present value of tax depreciation increases by about 6%. If inflation rises to 10%, the present value of tax depreciation drops by about 8% relative to the value at 5% inflation. By contrast, consider the line labeled "39-yr" that shows the effect of inflation on depreciation for nonresidential real property.\textsuperscript{239} Figure 1 shows that a decline in the inflation rate from 5% to 2% would lead to an almost 40% increase in the value of the depreciation deductions, and an increase in the rate from 5% to 10% would lead to a 34% decline in the value of depreciation. Thus, the magnitude of the effect is significantly greater for nonresidential real property than for three-year property. An alternative way to view the change in the present value of the depreciation deductions is to compare the changes in the value of depreciation to a gross investment tax credit.\textsuperscript{240} Assuming a tax rate of 35%, in present value terms, MACRS at 2% inflation is equivalent to MACRS at 5% inflation combined with an investment tax credit of 1.6% for three-year property and 3.2% for nonresidential real property. Similarly, an increase in the inflation rate from 5% to 10% would be equivalent to a negative investment tax credit\textsuperscript{241} of 2.4% and 3.2% for three-year and nonresidential real property, respectively. Obviously, the present value of depreciation on the longer-lived property is more sensitive to inflation than is the present value on the shorter-lived property. While true, this observation may be misleading. In particular, comparing either the change in the present value of depreciation or the change in the equivalent gross investment tax credit rates does not indicate whether the changes are neutral with respect to asset class.\textsuperscript{242}

\textsuperscript{238} All values are discounted under the assumption that the real interest rate stays constant at 5% without regard to the level of inflation. The assumption of a constant real interest rate is consistent with the Fisher model. If the modified Fisher model were correct, the effect of inflation on depreciation would be magnified significantly. See note 226.

\textsuperscript{239} The recovery period for nonresidential real property was increased from 31.5 years to 39 years by the Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, § 13151(a), 107 Stat. 312, 448 (amending IRC § 168(c)(l)).

\textsuperscript{240} The term "gross investment tax credit" refers to an investment tax credit that does not have to be deducted from depreciable basis. See text accompanying notes 243-51 for a discussion of a net investment tax credit.

\textsuperscript{241} A negative investment tax credit is equivalent to a nondeductible excise tax.

\textsuperscript{242} See, e.g., Alan J. Auerbach, A Note on the Efficient Design of Investment Incentives, 91 Econ. J. 217, 222 (1981) [hereinafter Design] (showing that a gross investment tax credit is non-neutral); E. Cary Brown, The "Net" Versus the "Gross" Investment Tax
Fortunately, there are a variety of relatively simple ways to measure whether a particular investment incentive or disincentive is neutral across asset classes. One approach is to measure the incentive in terms of a modified form of an investment tax credit, a so-called net investment tax credit. A net investment tax credit is a tax credit based on the cost of an asset minus the present value of depreciation permitted with respect to the asset. Thus, for example, if there is a 10% net investment tax credit and the present value of depreciation on five-year property is $0.91 per dollar of investment, a taxpayer purchasing $1,000 worth of five-year equipment would be permitted a tax credit of $9 in addition to economic depreciation. Unlike the com-

Credit, in Depreciation and Inflation, note 198, at 133-34 (providing a mathematical proof that a uniform gross investment tax credit is not neutral with respect to asset life); Emil M. Sunley, Acceleration of Tax Depreciation: Basic Issues and Major Alternatives, in Depreciation and Inflation, note 198, at 145-46 (comparing various measures of the economic impact of depreciation and investment tax credit changes and noting that "[a]lthough an equal percentage increase in the present value of tax savings from capital recovery may have some intuitive appeal as a criterion for neutrality, economic theory gives no underpinning for this measure.").

Brown, note 242, at 134.

$9 = (10\% \times \$1,000) \times (1.00 - 0.91)$. An equivalent approach to a net investment tax credit is an equal gross credit combined with a required basis reduction equal to the deduction equivalent of the credit. The deduction equivalent of the credit is the amount of the credit divided by the taxpayer's marginal tax rate. Thus, for example, if the taxpayer in the example in the text faces a 35% marginal tax rate, under the gross credit with basis reduction, she would be entitled to a credit of $100 (10\% \times \$1,000) and would be required to reduce her basis by $286 ($100/35\%). It is easy to demonstrate that the net investment tax credit is equivalent to a gross credit with basis reduction on a present value basis. Define $V_n$ as the present value of all benefits under a net credit, $z$ as the present value of economic depreciation, $\tau$ as the marginal tax rate, and $k$ as the amount of the credit. Under a net credit, the value of the credit plus depreciation per dollar of investment is:

$$V_n = k \times (1 - z) + (z \times \tau)$$  \hspace{1cm} (1)$$

Equation (1) can be rewritten:

$$V_n = k + z \times (\tau - k)$$  \hspace{1cm} (2)$$

Dividing the second term in Equation (2) by $\tau$, one obtains:

$$V_n = k + z \times (1 - \frac{k}{\tau}) \times \tau$$  \hspace{1cm} (3)$$

Equation (3), however, is precisely the formula for $V_n$, the present value of all benefits under a gross credit with full basis offset. Thus, the two forms of credit are equivalent.

Congress has vacillated on the question of basis reduction. When the credit was introduced in 1962, taxpayers were required to reduce basis by the amount of the credit. Revenue Act of 1962, Pub. L. No. 87-834, § 48(g), 76 Stat. 960, 970. The basis reduction requirement was repealed in 1964. Revenue Act of 1964, Pub. L. No. 88-272, § 203(a)(1), 78 Stat. 19, 33. In 1982, Congress reinstated a partial basis reduction, requiring taxpayers to reduce their basis by one-half of the amount of the investment tax credit. IRC § 48(q) (added by Tax Equity and Fiscal Responsibility Act of 1982, Pub. L. No. 97-248, § 205(a), 96 Stat. 324, 427). Given the then top corporate tax rate of 46\%, IRC § 11(b) (1982), in order for a uniform gross credit to be equivalent to a uniform net investment tax credit, the basis reduction would have had to have been approximately twice the credit. Of course, the investment tax credit was also non-neutral because it was not uniform across asset types. IRC § 46(c)(2) (1982) (reducing the investment tax credit for short-term property);
Combination of economic depreciation and a uniform gross investment tax credit, the combination of economic depreciation and a uniform net investment tax credit is neutral with respect to asset choice. Correspondingly, if different classes of assets are permitted different net investment tax credits, neutrality is lost.


Brown, note 242, at 134; Auerbach, Design, note 242, at 222.

The net investment tax credit also can be restated in terms of an alternative measure of accelerated depreciation, the “incentive depreciation index.” See Joint Committee Report, note 256, at 90. To understand the incentive depreciation index, compare a pure consumption tax to a pure income tax. Under a consumption tax, an investment in depreciable property would be fully expensed (that is, the entire cost of the capital investment would be fully deductible at the time the investment is made). See generally William D. Andrews, A Consumption-Type or Cash Flow Personal Income Tax, 87 Harv. L. Rev. 1113 (1974); Bradford, Untangling, note 42, at 59-99. Permitting the expensing of the investment effectively removes the income from the investment from the tax base. See, e.g., Michael J. Graetz, Implementing a Progressive Consumption Tax, 92 Harv. L. Rev. 1575 (1979); Alvin C. Warren, Jr., Fairness and a Consumption-Type or Cash-Flow Personal Income Tax, 88 Harv. L. Rev. 931 (1975). Thus, relative to an income tax with economic depreciation, a consumption tax provides an incentive for investment. Moreover, expensing is a neutral incentive; if all investment income is tax-exempt, there is no tax incentive to invest in one type of asset over another. Not only are both expensing and economic depreciation neutral with respect to asset type, but so is any linear combination of the two. See, e.g., Auerbach, Design, note 232; Bradford, Issues, note 232, at 27; Harberger, note 232, at 307.

In other words, if taxpayers are permitted to expense α percent of the cost of an asset and are permitted economic depreciation for the remaining (1 − α)% of the cost of the asset, the resulting depreciation is neutral with respect to asset life. Define such a depreciation scheme as “incentive depreciation” and define the percentage of expensing, α, as the “incentive depreciation index.” When the incentive depreciation index, α, is equal to one, incentive depreciation is equivalent to expensing, and when the incentive depreciation index is equal to zero, incentive depreciation is equivalent to economic depreciation. The index, α, also can be less than zero or greater than one. If α is greater than one, taxpayers effectively are permitted to expense more than the cost of the asset, but are required to take “negative depreciation” into income over the life of the asset. Putting aside questions of inflation, if α is greater than one, investments are subject to a negative effective tax rate. If α is less than zero, taxpayers effectively are required to take an amount into income upon the purchase of an asset, but are permitted to depreciate more than the cost of the asset. Ignoring the effects of inflation, if α is less than zero, the investment is subject to an effective tax rate in excess of the statutory rate.
The neutrality property associated with a net investment tax credit suggests a straightforward procedure to test whether inflation has a neutral effect across asset classes. Just as it is possible to measure the incentive effect for each asset class in terms of an equivalent gross investment tax credit for that class, it is possible to measure the effect in terms of an equivalent net investment tax credit for each asset class. Thus, one can test whether a particular accelerated (or decelerated) depreciation scheme is neutral across asset classes by replacing it with an equivalent net investment tax credit plus economic depreciation for each asset class. If the net investment credits so determined are uniform, the accelerated depreciation, and hence the effect of inflation, is neutral. If the net investment credits are not uniform, then the effect of inflation is non-neutral.

For a given tax rate, \( \tau \), and net investment credit, \( k \), it is straightforward to show that there exists an incentive depreciation index, \( \alpha \), such that incentive depreciation is equivalent to economic depreciation combined with the specified net investment credit. Define \( V_a \) as the value of incentive depreciation on a one dollar investment, given incentive depreciation index \( \alpha \) and \( z \) as the present value of economic depreciation on such an investment.

\[
V_a = \tau \times (\alpha + (1 - \alpha) \times z)
\]  

Similarly, as in note 244, Equation 3, define \( V_e \) as the present value of all benefits under a net credit, \( k \).

\[
V_e = k \times (1 - z) + (z \times \tau)
\]  

Setting \( V_e \) equal to \( V_a \), and simplifying, one obtains:

\[
\alpha = \frac{k}{\tau}
\]  

Therefore, a net investment credit of \( k\% \) is equivalent to an incentive depreciation index, \( \alpha \), equal to \( k \) divided by the tax rate, \( \tau \).

In order to compute the net investment tax credit that, when combined with economic depreciation, is equivalent to a given degree of accelerated depreciation, define \( V_n \) as the present value of all benefits under a net credit, \( z \) as the present value of economic depreciation, \( \tau \) as the marginal tax rate, \( k \) as the amount of the credit and \( d \) as the present value of the accelerated depreciation. The net credit, \( k \), must satisfy the condition:

\[
d = V_n
\]  

Substituting \( V_n \) from Equation (1) in note 244 one obtains:

\[
d = k \times (1 - z) + (z \times \tau)
\]  

Rearranging terms, \( k \), the incentive equivalent net credit must equal:

\[
k = \tau \times \left[\frac{d - z}{(1 - z)}\right]
\]
Figure 2

Equivalent net investment credit by MACRS asset class as function of inflation; relative to 5% inflation.

Figure 2 shows the effect of different inflation rates on each MACRS asset in terms of an equivalent net investment tax credit. First, consider the point on the horizontal axis indicating 5% inflation. If the inflation rate is 5%, by assumption, the equivalent net investment tax credit is zero. Therefore, all of the lines on the graph cross the horizontal axis at 5%. Now consider the effect of a decrease in inflation. As inflation decreases, the value of the unindexed MACRS depreciation increases for each class, but at different rates. In particular, consider an inflation rate of 2%, and the three-year and 39-year MACRS classes. In the case of three-year equipment, at 2% inflation, MACRS is equivalent to economic depreciation plus an approximately 10% net investment tax credit. By contrast, in the case of nonresidential real property (39-year property), at 2% inflation, MACRS is equivalent to economic depreciation plus an approximately 4% net investment tax credit. Thus, under the assumption that MACRS is neutral given 5% inflation, MACRS loses its neutrality as the inflation rate drops. In particular, as inflation drops, MACRS acts as a relative preference for short-lived property. As can be seen by a glance at Figure 2, the preference for short-lived over longer-lived property as inflation falls extends to all MACRS classes.

248 The computations underlying Figure 2 assume that for each class of assets, MACRS at 5% inflation is equivalent in present value terms to economic depreciation with no investment tax credit.

249 See note 251 (showing that the relationship in the text between inflation and asset-life preference does not hold for all possible asset lives).
Similarly, consider the effect of an increase in inflation. If inflation rises to 10%, MACRS depreciation on three-year property is equivalent to economic depreciation with a 14% negative net investment tax credit. By contrast, with nonresidential real property, the effect of 10% inflation is equivalent to only a negative 4% net investment tax credit. Thus, as inflation rises, MACRS acts as a relative preference for long-lived property.250 Again, Figure 2 shows that the preference for long-lived property with increases in inflation extends to all MACRS classes.251

In summary, even if Congress has provided accelerated depreciation to compensate for an expected rate of inflation, changes in inflation not only will have the effect of making the given degree of acceleration either inadequate or overly generous, but also will have incentive effects that vary by asset life, thereby inducing additional inefficiencies.252

A further problem with using accelerated depreciation in lieu of indexed economic depreciation is that front-loaded deductions increase the chance that firms will be unable to use the deduction currently because of net operating losses.253 If firms are forced to defer the

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250 The relationship between inflation and the preference for short- or long-lived property is opposite what would be predicted by looking at the effect of inflation on the present value of the depreciation benefits or by computing an equivalent gross investment tax credit. See notes 235-42.

251 While it is true that within the range of asset lives covered by MACRS, lower inflation favors short-lived assets and higher inflation favors long-lived assets, this relationship between inflation and asset lives does not hold for all possible asset lives. To see this, consider the extreme cases of an asset that depreciates instantaneously (that is, is properly expensed under an income tax) and an asset that never depreciates. In the case of the instantaneous asset, the deduction would be taken immediately and, therefore, inflation would have no effect on the value of the deduction. Thus, the equivalent net credit would be zero without regard to the rate of inflation. Similarly, in the case of the nondepreciable asset, since the depreciation deductions are zero in every year, inflation has no effect on the value of depreciation and the equivalent net credit also would always be zero. Thus, as asset life becomes either very short or very long, the equivalent net credit approaches zero and becomes both uniform and neutral. See Bradford, Issues, note 232, at 34-35 (making a similar argument).

252 One author has concluded that "[w]e ought to get on with [indexing] and not continue to allow policymakers to engage in what I think is a cruel delusion—that it is somehow possible to deal with the problem posed by inflation in an income tax structure by means of accelerated depreciation." Dale Jorgenson, Comments, in Depreciation and Inflation, note 198, at 56.

253 The inability to use all of the deductions currently is particularly a problem for start-up firms. It is possible to argue that it is appropriate to defer the deduction with a start-up firm because, if the firm is ultimately successful, it is likely that the firm was generating deferred income during the period that it had tax losses; if the firm is ultimately a failure, it is unlikely to ever pay taxes. See Steuerle, note 37, at 147 (noting that many start-up firms will be unable to use the benefit of accelerated depreciation). Steuerle also notes that accelerated depreciation leads to misleading income reports that may cause incorrect decisions. Id.
deductions, the benefit of accelerated depreciation is forgone.\textsuperscript{254} Congress could solve the problem of deferred losses by establishing an efficient means of transferring losses, such as safe harbor leasing; but efficient transferability of losses generally has proven politically infeasible.\textsuperscript{255} Absent formal means of transferring losses, firms resort to a myriad of informal means including conventional leasing and mergers. Such informal means tend to be far less efficient, measured both by the percentage of the benefits retained by the transferor and by the private and public resources expended in planning, executing and attempting to discourage such transactions.

Another difference between accelerated depreciation and indexed real depreciation is the consequences of the disposition of a depreciable asset that has not yet economically depreciated completely.\textsuperscript{256} The difference can be seen best by comparing several examples, the first for indexed real depreciation and the second for accelerated depreciation without indexation of basis:\textsuperscript{257}

\textit{Example 23:} \textit{Hal} purchases a depreciable asset for $1,000. Economically, the asset depreciates by 20\% in the first year. \textit{Hal}, therefore, is permitted a first-year depreciation deduction of $200. After one year, \textit{Hal} decides to sell the asset. Given that there has been 5\% inflation, the asset sells for $840.\textsuperscript{258} After adjusting for depreciation and for inflation, \textit{Hal}’s basis in the asset also would be $840 and, therefore,

\begin{itemize}
  \item The inability to use deductions currently would be less important if net operating losses were indexed. See note 195 (discussing the need to index net operating losses).
  \item Former IRC § 168(f)(8) (before repeal by Pub. L. No. 97-248, § 209(a), 96 Stat. 324, 442 (1982) (providing a type of safe harbor leasing). While politically unpopular, safe harbor leasing proved to be a highly efficient means of transferring tax losses. See Reed Shuldiner, Markets in Taxes (1985) (unpublished Ph.D. dissertation, M.I.T.) (showing that under safe harbor leasing, transferors were able to capture approximately 95\% of the tax benefits). For a contrary view, see Staff of Joint Comm. on Tax’n, 97th Cong., 2d Sess., Analysis of Safe-Harbor Leasing 17 (Comm. Print 1982) (estimating that transferors were able to capture only about 75\% of the tax benefits).
  \item Implicit in the discussion that follows is the assumption that if indexing were permitted for computing depreciation, indexing also would be permitted for computing gain or loss on the sale of depreciable assets. If indexing were permitted for the former, but not for the latter, the benefits of indexing effectively would be partially recaptured upon sale or other disposition. If indexing were permitted to determine gain or loss upon sale, but only unindexed economic depreciation were allowed, taxpayers would have an incentive to churn assets in order to receive the benefits of indexation.
  \item The examples are based on Table 5.
  \item $840 = (1,000 - 800) \times 1.05.$
\end{itemize}
Hal would have no gain or loss upon the disposition of the asset. Thus, Hal would have the benefit of the full $200 first-year depreciation without recapture.

Example 24: Assume the same facts as in Example 23 except assume that Hal is permitted first-year accelerated depreciation of $375 and that indexing of basis is not permitted. Hal’s basis after the first year is, therefore, $625. Upon selling the asset for $840, Hal has gain of $215. Valued as of the first year, the $215 recapture in the second year is equivalent to income of $195. Therefore, taking into account both the initial deduction of $375 and the recapture of $215, the net present value of the accelerated depreciation as of the time the asset is originally purchased is only $180.

Thus, Examples 23 and 24 demonstrate that, in a case where accelerated depreciation and indexed economic depreciation are set to be equivalent under the assumption that the taxpayer will hold the asset for its entire economic life, if the taxpayer disposes of the asset after only one year, the present value of indexed depreciation (as of the time of purchase) exceeds the present value of accelerated depreciation.

In an attempt to remedy the problem of early disposition, it would be possible to combine accelerated depreciation with indexation by indexing the owner’s adjusted basis at the time of disposition.

Example 25: Assume the same facts as in Example 24 except that the taxpayer is permitted to index his adjusted basis. Prior to indexation, Hal’s adjusted basis is $625. With indexation, his indexed adjusted basis would increase to $656. Accordingly, he would have a taxable gain upon disposition of $184. As of the first year, the present value of the $184 recapture in the second year would be $167. Therefore, taking into account both the initial deduction of $375 and the recapture of $184, the net present value of the accelerated depreciation.

259 The accelerated depreciation is chosen so as to be equivalent to indexed economic depreciation with 5% inflation. See Table 5.

260 The present value computation assumes a discount rate of 10.25%. $195 = $215/1.1025.

261 $180 = $375 – $195. The $180 figure is the equivalent deduction, not the tax savings, which would depend on Hal’s marginal tax rate. Hal’s tax rate is assumed to be constant.

262 $656 = $625 \times 1.05.

263 $184 = $840 – $656.

264 $167 = $184/1.1025.
depreciation, as of the time the asset was originally purchased would be $208.265

Thus, if a taxpayer is permitted both to use accelerated depreciation and to index his adjusted basis, in some cases the combination upon early disposition would be more favorable than indexed depreciation.266 In any case, accelerated depreciation loses its equivalence to indexed depreciation when taxpayers dispose of depreciable assets prematurely.267

C. Alternatives to Conventional Accelerated Depreciation

There are alternatives to indexed depreciation that solve some of the problems of conventional accelerated depreciation. One such alternative is to permit a single deduction at the time of asset purchase, so called one-shot depreciation. Under one-shot depreciation, the owner of a depreciable asset would be entitled to take a single depreciation deduction in the first year of ownership equal to the present value of the future real depreciation of the asset.268 The major advantage of one-shot depreciation over accelerated depreciation is that, as shown in Column G of Table 5, the present value of the one-shot depreciation deduction is invariant to inflation because the deduction is

\[ \text{Present Value} = \frac{\text{Future Value}}{(1 + \text{Inflation Rate})^n} \]

265 $208 = $375 - $167.

266 Another variant would be to permit taxpayers to index their unadjusted basis prior to subtracting depreciation. For example, under this rule, in Example 25, Hal would have an adjusted indexed basis immediately before sale of $675 (($1,000 x 1.05) - $375). He would have gain of $165 with a present value of $150. The net value to him would be $225.

267 The 1992 House Bill combined unindexed depreciation with indexing for purposes of determining gain on sale by denying indexing for purposes of determining the amount of any depreciation recapture, but permitting indexing of the taxpayer's unadjusted basis for purposes of determining any additional gain. H.R. 4210, note 73, at § 2101. The committee report provided the following example:

[Assume that] [a]n individual purchases depreciable property at a cost of $100 for use in his trade or business, claims $60 of depreciation, and then sells the property for $175. The applicable inflation ratio is 1.500. The taxpayer has $60 of gain attributable to recapture. The remaining gain is determined by using a $150 basis (i.e., $100 (the sum of $40 basis before recapture plus $60 recapture) multiplied by 150 percent). Thus, in addition to the $60 of recapture, the taxpayer has $25 of capital gain.

H.R. Rep. No. 461, note 73, at 358. The bill also would have modified § 1250 (recapture of gain on disposition of real property) to provide that the entire amount of prior depreciation is subject to recapture on the disposition of indexable § 1250 property. H.R. 4210, note 73, at § 2101(c).

taken at the same time the asset is purchased.\textsuperscript{269} Thus, the cost of the asset and the depreciation deduction are not measured in different dollars. The determination of the amount of the one-shot deduction, however, depends upon assumptions as to the real interest rate.\textsuperscript{270} As a result, the appropriate depreciation rate depends on events that occur after the depreciation rate has been set. In particular, if the rate of inflation affects the real interest rate, one-shot depreciation no longer is equivalent to indexed economic depreciation\textsuperscript{271}

There are additional problems with one-shot depreciation. For example, large initial deductions are likely to cause more firms to be in loss positions, thereby undoing at least some of the advantage of the approach.\textsuperscript{272} Additionally, under one-shot depreciation it would be necessary to make special provisions for the treatment of sales of depreciated assets.\textsuperscript{273}

An additional alternative to conventional accelerated depreciation would be to provide for depreciation equal to expected indexed real depreciation. Under such a scheme, Congress would provide for depreciation deductions equal to the deductions that would be allowed if there were indexed real depreciation and inflation were at an assumed rate. Thus, in the example shown in Table 5, if Congress expected inflation to continue at 5\%, it could provide for the depreciation schedule shown in Table 5, Column $D$. A taxpayer would be entitled to the stated depreciation schedule without regard to the actual rate of inflation. In essence, Congress would be indexing for expected, but not actual inflation.\textsuperscript{274}

\textsuperscript{269} Presumably the deduction would be permitted when the asset was placed in service, not when it was purchased. Cf. Reg. § 1.167(a)-10(b) (providing that the period for depreciation begins when an asset is placed in service).

\textsuperscript{270} For example, if the real interest rate fell from 5\% to 2\%, the one-shot depreciation deduction would increase from $909 to $962.

\textsuperscript{271} See Don Fullerton, Andrew B. Lyon & Richard J. Rosen, Uncertainty, Welfare Cost and the "Adaptability" of U.S. Corporate Taxes, 86 Scandinavian J. Econ. 229 (1984) (showing how different depreciation schemes are affected by inflation). See note 226 and Section VIII for a discussion of the relationship between inflation and the real rate of interest. It is likely, however, that one-shot depreciation would be less sensitive to inflation than conventional accelerated depreciation.

\textsuperscript{272} See text accompanying note 253 (discussing the problem of accelerated depreciation and loss firms).

\textsuperscript{273} See text accompanying notes 256-67 (discussing the problem of sales of depreciated assets in the context of accelerated depreciation). The Auerbach-Jorgenson proposal would deal with dispositions by not requiring a seller of depreciable assets to include the entire sales proceeds in income. In essence, they would tax a seller as if its amount realized were equal to the one-shot depreciation permitted to the purchaser of the asset and the seller's basis were equal to zero.

\textsuperscript{274} It also would be possible to combine expected indexed depreciation with a catch-up at disposition based on actual inflation over the holding period. Such an approach would have little advantage over indexed depreciation.
VIII. INDEXING INVENTORIES

As is generally the case with buying and selling assets, income from transactions in inventory is mismeasured under inflation. The effects of inflation on inventory can be seen from a simple example.

*Example 26:* A hardware store purchases a hammer for $2 on June 1, 1994, and sells the hammer on June 1, 1995 for $3. Under conventional accounting, the hardware store would be considered to have $1 in gross profit from the purchase and sale of the hammer.

If inflation were 10% during the year that the hammer was in inventory, the store's profit would be overstated. Properly stated in 1995 dollars, the store would have an indexed cost of goods sold of $2.20\(^{275}\) and would have an indexed gross profit of only $.80.

The failure to index inventories has had a significant effect on the amount of taxes collected from the business sector.\(^{276}\)

While Treasury has recommended indexing inventories,\(^{277}\) Congress has been unwilling to do so. In part, the pressure to index inventories has been reduced by the existence of the last-in, first-out (LIFO) method of accounting for inventories which acts as an ad hoc method of indexation.\(^{278}\) Under first-in, first-out (FIFO) inventory accounting

\(^{275}\) $2.20 = $2 \times 1.10.$

\(^{276}\) Feldstein and Summers estimate that the failure to index inventories for inflation raised taxes on nonfinancial corporations in 1977 by $7 billion, approximately 12% of the corporations' total tax liability for the year. Feldstein & Summers, note 213, at 446. As with capital gains, the failure to index inventories is ameliorated to the extent that income is deferred with respect to inventories. The deferral of income with respect to inventories has been reduced by the enactment of the uniform capitalization rules, IRC § 263A. See text accompanying note 42 (discussing the relationship between deferral and indexing of capital gains).

\(^{277}\) See Treasury II, note 220, at 174-78 (recommendating indexing inventories); Treasury I, note 152, at 189-92 (same).

\(^{278}\) See, e.g., Halperin & Steuerle, note 103, at 356 (describing LIFO as ad hoc indexation). LIFO accounting is authorized by § 472. LIFO was not authorized originally in order to compensate for inflation. LIFO's origin can be traced to the initial reporting of inventories under the income tax law. 1 Leslie J. Schneider, Federal Income Taxation of Inventories § 9.01 (1993). The LIFO method derived from the 'base stock method' of inventory valuation, where the taxpayer was assumed to carry each year at its original cost a base amount of inventory as if it were a fixed asset. Id. Under the base stock method, taxpayers were assumed to liquidate their base inventory only if sales in a given taxable year exceeded purchases. LIFO discards the base quantity concept and completely reverses the flow of goods assumption not only as to beginning inventory but also as to purchases occurring during the taxable year. Id. In 1930, the U.S. Supreme Court, in *Lucas v. Kansas City Structural Steel Co.*, 281 U.S. 264, 267 n.4 (1930), endorsed the position taken by the Service in *T.B.R. 65*, 1 C.B. 51 (1919), that the base stock method was not an acceptable method of inventory valuation for tax purposes. Faced with an adverse
a taxpayer treats sales of inventories as coming out of the oldest inventory on hand.\textsuperscript{279} Under LIFO a taxpayer is permitted to treat sales of inventory as occurring from the most recently purchased inventory.\textsuperscript{280} In periods of rising costs, FIFO tends to minimize costs of goods sold and hence maximize taxable income. Similarly, LIFO tends to maximize cost of goods sold and, hence, minimize taxable income. The operation of LIFO can be seen from a simple example.\textsuperscript{281}

Example 27: Assume that the hardware store in Example 26 purchased an additional hammer in 1995 for $2.20. Under LIFO, the store would be permitted to treat the hammer sold during 1995 as being the hammer that was purchased during

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\textsuperscript{279} Treasury II, note 220, at 174.

\textsuperscript{280} IRC § 472(b)(1) (treating inventory remaining on hand as being first from the taxpayer’s opening inventory).

\textsuperscript{281} The actual operation of the LIFO rules are extremely complex. Anyone who doubts the complexity of the LIFO rules should look at Reg. § 1.472-1, -2, -3, -4, -5, -6, -7, and Schneider, note 278, at §§ 9-17. The complexity of LIFO was apparently recognized early on. Henry C. Simons argued that:

"If LIFO is not the most complicated of averaging schemes, and the least effective, my judgment on tax issues (as many readers will perhaps readily agree) is worthless. Any crude scheme of averaging rebates, not to mention flexibility in inventory procedure, would enable us to get rid of an unlovely contribution of uninspired statistical empiricists to our tax edifice."

Simons, note 278, at 106.
1995. As a result, the store would have a cost of goods sold of $2.20 and would have gross profits of $.80.

As illustrated in Example 27, LIFO can produce results that are the same as indexed inventory accounting. There are, however, a variety of problems with the use of LIFO in lieu of indexation. First, particularly in the case of small firms, LIFO’s complexity is believed to discourage its use. Second, the conformity requirement, which prohibits the use of LIFO unless the taxpayer uses it for financial accounting purposes, also discourages its use. Because LIFO depresses profits, firms may be reluctant to use it for reporting profits to shareholders. Third, LIFO is not available to all taxpayers. For example, security dealers are required to mark their inventories to market and thus are unable to use LIFO. Whatever the cause,

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282 The term "indexed inventory accounting" is not well defined because there are many methods of accounting for inventory. For purposes of the discussion in the text, I assume the use of indexed FIFO accounting. See Treasury II, note 220, at 175 (proposing indexed FIFO accounting).

283 Id. Congress has twice responded to the complexity of LIFO by providing simplified LIFO rules for small business. In 1981, Congress added an election for small business to use a single inventory pool. Economic Recovery Tax Act of 1981, Pub. L. No. 97-34, § 237(a), 95 Stat. 172, 252-53 (adding IRC § 474). See also Staff of Joint Comm. on Tax’n, 97th Cong., 1st Sess., General Explanation of the Economic Recovery Tax Act of 1981, at 149 (Comm. Print 1981) (“Since LIFO is the current method of accounting for inventory that most effectively mitigates the effect of inflation on businesses engaged in the purchase and sale of merchandise the Congress believed that the LIFO method should be simplified and made more available to all taxpayers.”). In 1986, Congress replaced § 474 with a new provision providing a simplified dollar-value LIFO method for certain small businesses. Tax Reform Act of 1986, Pub. L. No. 99-514, § 802(a), 100 Stat. 2085, 2348. To the extent that LIFO is used despite its complexity, the fact remains that it is a complex costly system under which firms spend substantial real resources.

284 IRC § 472(c)(requiring reporting on a LIFO basis to owners and creditors); Reg. § 1.472-2(e)(providing rules governing the conformity requirement).

285 Treasury II, note 220, at 175 (noting that some firms are unwilling to use LIFO because of the conformity requirement). While it is widely believed that the conformity requirement reduces the use of LIFO, such a belief is inconsistent with the efficient markets hypothesis. Richard A. Brealey & Stewart C. Myers, Principles of Corporate Finance 295 (4th ed. 1991) (discussing various forms of the efficient markets hypothesis); see also Louis Lowenstein, Pruning Deadwood in Hostile Takeovers: A Proposal for Legislation, 83 Colum. L. Rev. 249, 288-89 (1983) (suggesting that corporations remain on FIFO because they do not believe in efficient markets and that when they do switch to LIFO, they pick a year of increased earnings so that the earnings hit from the change will be less noticeable); Shyam Sunder, Stock Price and Risk Related to Accounting Changes in Inventory Valuation, 50 Acct. Rev. 305, 314 (1975) (showing that stock prices increase in the 12 months preceding a change to LIFO).

286 IRC § 475. See text accompanying note 71 (arguing that indexation is particularly important for taxpayers using mark-to-market accounting). See also text accompanying notes 174-82 (discussing procedure for indexing assets accounted for on a mark-to-market basis).
Treasury has estimated that as of 1981, 70% of inventories were valued using FIFO, rather than LIFO or some other method.\textsuperscript{287} Additionally, LIFO is not a perfect substitute for indexed depreciation. To begin with, LIFO does not exclude inflationary gains, but merely defers the realization of inflationary gains. When overall levels of inventory are reduced, taxpayers using LIFO effectively are required to take their deferred inflationary gains into income.\textsuperscript{288} The taxation of deferred inflationary gains when inventories contract provides a noneconomic incentive to maintain inventories and, in some cases, to merge corporations so as to prevent taxation of such deferred gains.\textsuperscript{289}

Finally, because LIFO generally operates based on changes in the price of the inventory, rather than changes in the overall price level, LIFO either will overcorrect or undercorrect for inflation to the extent that prices have risen more quickly or slowly in the inventoried goods than overall.\textsuperscript{290} The divergence between LIFO and indexed FIFO can be clarified by a couple of examples.

\textit{Example 28:} Assume the same facts as in Example 27, except that the price of hammers remained unchanged at $2.00, despite a general 10\% inflation. Using LIFO (or FIFO), the store would have a cost of goods sold of $2.00 and gross profits of $1.00. The taxpayer's real income, however, would be only $.80. Thus, where overall inflation is greater than the change in the price of the inventory item, LIFO overstates the taxpayer's real income.

\textit{Example 29:} Assume the same facts as in Example 27, except that while the price of hammers increased to $2.20, overall prices remained constant. Using LIFO, the store would have a cost of goods sold of $2.20 and gross profits of $.80. The store’s real profits, however, would be $1.00.

\textsuperscript{287} Treasury II, note 220, at 178 (using data from 1981 corporate income tax returns).
\textsuperscript{288} Id. at 175. The inflationary gain begins to be recaptured when the taxpayer has sold all inventory purchased in the current year and begins to sell (or is treated as selling) inventory purchased in previous years.
\textsuperscript{290} IRC § 472(b)(2) (providing that the inventory is inventoried at cost). In some circumstances, taxpayers are permitted to value LIFO inventories based on price indices. See IRC § 474 (providing a simplified dollar-value LIFO method for certain small businesses); Reg. § 1.1472-8 (permitting dollar-value pricing of LIFO inventories). Even where price indices are used, however, they are generally for a specific category of goods. See, e.g., IRC § 474(b) (permitting retailers to use a general expenditure category of the Consumer Price Index Detailed Report).
Thus, *Example 29* demonstrates that where overall inflation is less than the change in the price of the inventory item, LIFO understates the taxpayer's real income.

In summary, LIFO provides only a partial solution to the problem of inflation. Moreover, given the complexity of the LIFO method, it is not clear that explicitly indexing inventories would pose greater administrative burdens than does LIFO.

IX. **Indexing Debt**

As with other investments, a holder's basis in a debt instrument must be indexed in order to measure income properly.291 Similarly, proper measurement of the borrower's income requires indexing the principal amount of a loan.292

*Example 30:* B borrows $100 from L and promises to pay back $115 in one year. In the absence of inflation, B would have a $15 interest deduction and L would have $15 in interest income. If, however, there was 10% inflation, the inflated principal amount of the debt would be $110 and when B repays $115, in economic terms she would be repaying $110 in inflated principal and $5 in interest. Therefore, B should have an interest deduction of only $5 and L should have corresponding interest income of $5.

### A. Timing of the Inflation Adjustment

Generally, in the case of debt, indexing adjustments could be made either when principal is repaid ("indexing principal") or when interest is paid ("indexing interest").293 If principal were indexed, at maturity the debtor would have income equal to the difference between the indexed and unindexed repayment of principal and the creditor would have a corresponding loss. If interest were indexed, each interest payment would be treated partially as a return of indexed principal and partially as interest. The amount of the payment that was treated as a return of indexed principal would be equal to the inflation adjustment.

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292 Indexing the principal amount of the loan is similar to indexing the amount realized in the writing of an option. See text accompanying notes 134-38.

293 The terms "indexing principal" and "indexing interest" are used for convenience. In both cases, it is the outstanding principal balance that is being adjusted for inflation.
since the last payment of interest. The remaining payment, if any, would be treated as interest.294

Example 31: B issues at par a $1,000 debt instrument with a 10-year term bearing 15% interest at a time when inflation is 10% a year.

Alternative 1: If principal were indexed, B would be permitted an interest deduction for the entire $150 payment each year. At maturity, B would have income of $1,594, equal to the difference between $2,594,295 the indexed principal, and $1,000, the amount of principal repaid.

Alternative 2: If interest were indexed, the $150 annual payment would be treated partially as a return of indexed principal and partially as interest. Initially, the loan has a $1,000 principal balance. At the end of the first year, the loan balance, properly indexed, would have increased to $1,100. In other words, the lender would now need a payment of $1,100 in principal, in addition to any interest, in order to be made whole. The remaining balance on the loan is, of course, only $1,000. Accordingly, $100 of the interest payment would be treated as a repayment of principal. The remaining $50 would be treated as interest. Similar computations would be made for each year of the term. Since indexed principal would be treated as repaid each year, there would be no lump-sum adjustment to income at maturity.296

Presumably, under either alternative, the lender generally would be treated in the same manner as the borrower.

Overall, it is preferable to index interest, rather than principal.297 Indexing interest more closely approximates true economic income by taking into account both the interest payments and the real change in principal on a current basis.298 Moreover, indexing interest makes the taxation of the debt more nearly independent of the rate of infla-

294 Since the inflation adjustment is based on actual inflation, rather than expected inflation, the adjustment could be in excess of the interest payment. See text accompanying notes 309-11.
295 $2,594 = $1,000 \times 1.10^{10}$.
296 Under Alternative 1, indexing only at maturity, the total indexation adjustment in Example 31 is $1,594. Under Alternative 2, indexing annually, the total indexation adjustment is only $1,500 (10 \times $150). The $94 difference between the two adjustments reflects the compounding that occurs when the indexing adjustment is not made currently.
297 The indexing adjustment also could be made when interest is deemed paid. See the discussion of original issue discount below at text accompanying notes 320-27.
298 See text accompanying note 48 (discussing timing of inflation adjustments in general).
tion. Indexing interest also avoids large fluctuations in income by taking inflation into account on a regular basis. While, in the case of installment debt where principal is paid over the term of the debt, there is no particular administrative advantage to indexing principal rather than interest, when the entire principal balance of the debt is payable at maturity, indexing principal is administratively simpler.300

B. Distinguishing Between Actual and Expected Inflation

A lender must set an interest rate that is high enough to cover both the real interest rate and expected losses due to inflation.301 Thus, a lender planning to lend $P$ dollars who demands a real return of $r$ and expects an inflation rate of $\pi^e$, must set an interest rate of $i$, such that the present value of the interest and principal payments, stated in constant dollars, $Z$ equals the amount lent. In other words, $i$ must satisfy the following equation:

$$P = \frac{P(1 + i)}{(1 + \pi^e)}$$

Equation (3) easily can be solved for $i$:302

$$i = r + \pi^e + (r \times \pi^e)$$

If $r$ and $\pi^e$ are small, their product $r \times \pi^e$ can be ignored, leading to the classic Fisher equation:303

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299 The taxation of the debt would still depend on the difference between expected and actual inflation.

300 Indexing principal also raises questions of whether the income to the borrower due to indexation should be treated as cancellation of indebtedness income. In particular, borrowers might argue that they were entitled to the various forms of relief offered to taxpayers with cancellation of indebtedness income. IRC § 108. Given that, economically, the income arises out of the fact that the borrower has taken excess interest deductions, rather than because the borrower is unable to repay the stated principal on the loan, such relief generally should not be offered.

301 For simplicity, the discussion in this Section ignores the effect of risk on interest rates. Also, the derivation of the Fisher equation that follows ignores the presence of income taxes. See Section IX.E for a discussion of the effect of income taxes on the real interest rate.

302 One way to interpret Equation (4) is to think of the first term, $r$, as compensation for the use of the principal, the second term, $\pi^e$, as compensation for the fact that the principal is repaid in inflated dollars, and the third term, $r \times \pi^e$, as compensation for the fact that the real interest, $r$, is repaid in inflated dollars.

Thus, for example, if the real interest rate is 5% and the expected rate of inflation is 10%, a lender must charge approximately 15% in order to be compensated both for inflation and for the real cost of funds.\textsuperscript{304}

The discussion so far, however, has assumed that indexing would be based on actual, not expected, inflation. The fact that the theory suggests that interest rates generally are based on expected, not actual, inflation raises the question of whether indexing should be based on expected or actual inflation. Over the life of the debt, as with other assets or liabilities, it is clear that indexing should be based on actual, not expected inflation, in the same way that the ultimate taxation of income on any investment is based on actual, not expected, earnings. Prior to the disposition or retirement of a debt instrument, however, the Code generally taxes on the basis of expected income, not actual income.\textsuperscript{305} Thus, for example, if a taxpayer purchases at par a 10-year bond with a 10% interest coupon and $1,000 principal, the taxpayer is presumed to have income of $100 per year. If, as of the end of the first year, however, market interest rates have dropped to 8%, the value of the bond will have increased to $1,125. Therefore, the taxpayer will have $125 in appreciation in addition to the $100 interest coupon. Under current law, the $125 would not be taken into income immediately.\textsuperscript{306}

The fact that income on debt generally is taxed on an expected basis suggests that, to be consistent, indexation adjustments during the term of the debt instrument should be made on the basis of expected inflation and the difference between expected and anticipated inflation should be taken into account upon redemption. While such an approach may have some intellectual appeal, it should be rejected on several grounds. First, it would require knowledge of the expected inflation rate, a figure that is essentially unknowable. Second, it would be significantly more complex, requiring both ongoing adjust-

\begin{equation}
i = r + \pi^e\end{equation}

\textsuperscript{5}

If the inflation rate and the real interest rate are compounded continually, Equation (3) in the text becomes:

\begin{equation}P = P \times e^t \times e^r \times e^\pi\end{equation}

which in turn implies:

\begin{equation}i = r + \pi^e\end{equation}

as in Equation (5) in the text. Fisher, Interest, supra, at 360-61. Unless noted otherwise, I assume annual compounding.

\textsuperscript{304} The exact rate given by Equation (4) is 15.5%.

\textsuperscript{305} Shuldiner, General Approach, note 79, at 268 (arguing that the original issue discount rules can be viewed as taxing expected income).

\textsuperscript{306} The appreciation would be recognized over the life of the debt instrument as part of the now above-market interest coupons. Thus, in a sense, the failure to tax on the basis of actual income is largely self-correcting prior to maturity. If inflation were adjusted for currently on an expected basis, it would not be self-correcting prior to maturity.
ments and a final adjustment at maturity. Finally, it would increase the timing option. 307 Where inflation was less than expected and, therefore, the holder of the debt instrument had an unanticipated gain, the holder would be able to defer the gain by continuing to hold the instrument. Where, on the other hand, inflation was more than expected and the holder of the debt instrument had an unanticipated loss, the holder would be able to recognize the loss currently by disposing of the instrument. 308

One disadvantage of basing the annual indexation adjustment on actual inflation is that the adjustment can exceed the amount of nominal interest. For example, consider a $1,000 debt instrument with a 10% interest coupon and an actual inflation rate of 12%. The inflation adjustment would be $120, 309 although the interest coupon would only be $100. The correct approach would be to treat the borrower as having zero interest expense and $20 of income. Correspondingly, the lender should have zero interest income and a $20 loss. As an alternative, the inflation adjustment in any year could be limited to the amount of otherwise determined interest income or expense. 310 Any remaining adjustment could be carried forward. 311 Upon final payment on the debt, any deferred gain or loss could be recognized.

C. Specific Issues Arising with Debt Indexation

1. Secondary Purchases of Debt Instruments

As with the purchaser of any asset, a secondary purchaser of a debt instrument should index by reference to his basis in the instrument, rather than by reference to the face amount of the instrument. Since, however, under current law, holders of debt instruments generally are


308 Of course, the same argument about the timing option can be a critique of the realization doctrine in general. See generally Shuldiner, General Approach, note 79, at 243. The point is that there is no reason to expand the timing option merely for the sake of theoretical consistency.

309 $120 = $1,000 \times 12\%.

310 It may be seen as too radical an idea to provide that borrowers have income when they pay interest and lenders get a deduction when they receive interest. Moreover, it might be difficult to enforce, given that existing reporting rules are premised on the assumption that borrowers deduct and lenders include interest. See, e.g., IRC § 6049 (requiring certain payors of interest to report the amount of interest paid); IRC § 6050H (requiring lenders to report the amount of interest received on home mortgages).

311 The amount carried forward should itself be indexed for subsequent inflation. See note 296 (noting that if the inflation adjustment is deferred, it must be increased to reflect subsequent inflation).
permitted to defer the inclusion of market discount, it may be appropriate to defer some portion of the indexation adjustment.\footnote{312 IRC § 1276 (taxing market discount as ordinary income upon disposition). But see IRC § 1277 (requiring the deferral in some circumstances of interest expense on debt incurred or continued to purchase or carry a market discount bond); IRC § 1286 (requiring market discount on a stripped bond to be included in income currently); IRC § 860C(b)(1)(B) (requiring a REMIC to include market discount currently).}

*Example 32:* X Co issues at par a $1,000, 10-year, 5% annual coupon bond. The next day, new inflation figures are released indicating that the inflation rate has increased from 3% to 8% and the market interest rate rises to 10%. Sarah purchases an X Co bond yielding 10% for $693.\footnote{313 The present value, using a 10% discount rate, of the principal and interest payments due on the bond is $693.} At the end of the first year, Sarah is paid $50 in interest on the bond. The inflation rate is 8% the entire time that Sarah holds the bond.

Assuming no further changes in interest rates, in nominal terms, Sarah has income in the first year of $69, or 10% of her investment. Because inflation is 8%, she should have an inflation adjustment of $55, and, therefore, should have net real income of $14, or 2% of her investment.\footnote{314 If the indexation adjustment were computed with regard to the face amount of the instrument, rather than Sarah's basis in the instrument, Sarah would have an $80 adjustment, incorrectly giving her net income of – $11.}

Under current law, however, Sarah would have current taxable income of only $50, the amount of the coupon.\footnote{315 IRC § 1276.} In nominal terms, she would be taxed, therefore, as if the instrument were yielding 7.2%.\footnote{316 7.2% = \$50/\$693.} The remaining $19, or 2.8% of her 10% yield, would be deferred. If she were permitted to take the entire inflation adjustment of $55 currently, she would have a current $5 loss,\footnote{317 (\$5) = \$50 – \$55. A $5 loss would represent a –0.8% yield on the bond.} as opposed to her economic income of $14.

A simple solution to the problem of market discount bonds would be to defer any net loss from the inflation adjustment until the market discount was recognized. Thus, in Example 32, Sarah would be permitted to offset her entire $50 of current interest with an inflation adjustment, but would not be able to take a loss. Limiting the inflation adjustment to the amount of the interest income would be overly generous in cases such as Example 32 where there was a change in the inflation rate before the bond was purchased, and overly harsh where the loss was due to an unanticipated increase in inflation. A more
exact solution would defer a portion of the inflation adjustment, determined by reference to the deferred portion of the yield. To do so, however, would necessitate computing the total yield on the bond; if the total yield on the bond was being computed anyway, there would be little reason not to tax it currently.\textsuperscript{318}

2. Installment Obligations

An installment obligation is a debt instrument where the principal is repaid in installments over the term of the loan.\textsuperscript{319} In the case of an installment obligation, indexing should be based on the outstanding principal balance in the loan over the relevant period. Example 33 illustrates the indexation of an installment obligation.

Example 33: Alex borrows $1,000, promising to repay $100 in principal each year plus 10\% interest on the outstanding balance. Inflation is 6\%.

At the end of the first year, Alex pays $100 in interest and $100 in principal. Because the outstanding principal balance was $1,000 over the first year, Alex would have an inflation adjustment of $60 and, therefore, would be treated as paying $40 in interest. Alex would have a remaining principal balance of $900.

At the end of the second year, Alex pays $90 in interest and $100 in principal. Because the outstanding principal balance was $900 over the second year, Alex would have an inflation adjustment of $54 and would be treated as paying $36 in interest. Alex would have a remaining principal balance of $800.

3. Original Issue Discount Obligations

In general, original issue discount obligations are taxed in each period as if the issuer makes a payment of current interest and the holder reinvests the amount of the deemed interest payment.\textsuperscript{320} The holder’s basis in the obligation is increased by the amount of the

\textsuperscript{318} In cases where market discount is created by a significant decrease in the creditworthiness of the borrower, there are independent arguments for permitting deferral.

\textsuperscript{319} A home mortgage is a common example of an installment obligation.

\textsuperscript{320} IRC § 1272(a)(1) (requiring current inclusion of original issue discount); IRC § 163(e) (permitting issuer a current deduction for original issue discount); IRC § 1272(a)(4) (adjusting issue price for prior accruals).
With indexation, the issuer would be treated as if it made a combined payment of interest and indexed principal and the holder reinvested both the deemed interest and the deemed principal payment. Thus, the amount of the original issue discount inclusion would be reduced by the inflation adjustment, but the holder’s basis, or adjusted issue price, would be increased by the full amount of the deemed payment. The following example demonstrates the indexing of an original issue discount bond.

Example 34: Y Co issues a two-year zero-coupon bond with a face amount of $1,000 for $826. The bond has a yield to maturity of 10%.\textsuperscript{322}

Under current law, the holder of the bond would have OID income of $83 for the first year and would increase its basis in the bond to $909. The holder would have income of $91 in the second year and would increase its basis to $1,000. The holder would have no further gain or loss at maturity.

Assume that inflation was 6% for the first year and 8% for the second year. Under indexation, the holder would have an inflation adjustment of $50 for the first year\textsuperscript{323} and would, therefore, have net OID income of only $33. The holder’s basis in the obligation, however, would increase by $83, the combined amount of the inflation adjustment and the net original issue discount.

For the second year, the holder would have an inflation adjustment of $73\textsuperscript{324} and would have net OID income of $18. The holder’s basis in the obligation would increase by $91 to $1,000. The holder would have no further gain or loss at maturity.

This discussion of OID obligations assumes that the income on the obligation accrues currently. While generally the OID rules require the current accrual of income, where there is contingent interest the rules generally provide for deferral until the contingency is resolved.\textsuperscript{325} If, under the applicable rules, the income from a debt oblig-
gation is deferred, it generally would be appropriate to defer the indexation adjustment until the income is realized. The more difficult case is where some of the interest is accrued currently and some of the interest is deferred. Thus, for example, an obligation might pay a current return of 4% and have a contingent payment that is expected to provide an additional yield of 5%. As with the case of stock that pays a current dividend and returns a portion of the yield as capital gain, it generally would be appropriate in such a case to match the inflation adjustment with the deferred return, thus deferring the adjustment until the contingency is resolved and the income accrued.\textsuperscript{326} Deferring the indexation adjustment on some, but not all, debt instruments, however, raises the further problem of identifying when a sufficient portion of the yield on a debt instrument is deferred such that the indexation adjustment also should be deferred.\textsuperscript{327}

4. Indexed Debt

It is possible to issue debt that is economically indexed to inflation. In general, as suggested by the following example, it would be straightforward to index for tax purposes debt issued in indexed form.

\textsuperscript{326} See text accompanying notes 106-20 (discussing the appropriate timing of indexation adjustments with debt and stock).

\textsuperscript{327} To the extent that taxpayers are required to bifurcate debt instruments into a contingent and noncontingent component, a reasonable solution would be to permit a current indexation adjustment with respect to the amount of the issue price allocated to the noncontingent component, while deferring the adjustment with respect to the amount of the issue price allocated to the contingent component. See Prop. Reg. \textsuperscript{1} 1.1275-4(g) (1991) (requiring the allocation of issue price between the contingent and noncontingent payments on a debt instrument).
Example 35: In 1990, B issues a five-year debt instrument for $1,000. Under the terms of the instrument, the principal balance of the debt is increased each year by the amount of inflation. In addition, B pays annual interest equal to 5% times the indexed principal amount. At maturity, B repays the indexed principal. Assuming a 10% inflation rate each year, the following table shows the interest payable each year and the principal balance of the debt:

<table>
<thead>
<tr>
<th>Year</th>
<th>Indexed Principal</th>
<th>Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>$1,100</td>
<td>$55</td>
</tr>
<tr>
<td>1992</td>
<td>1,210</td>
<td>61</td>
</tr>
<tr>
<td>1993</td>
<td>1,331</td>
<td>67</td>
</tr>
<tr>
<td>1994</td>
<td>1,464</td>
<td>73</td>
</tr>
<tr>
<td>1995</td>
<td>1,611</td>
<td>81</td>
</tr>
</tbody>
</table>

Under current law, the taxation of an indexed obligation such as the instrument described in Example 35 is uncertain and complex. If debt were indexed for tax purposes, however, the taxation would be straightforward. Each year the issuer would be permitted a deduction for the interest payment on the note. Correspondingly, the holder would take the interest into income. Because the principal is indexed for inflation, there would be no inflation gain or loss.\(^{328}\) While indexed debt instruments are uncommon in the United States, it is likely that if debt were indexed for tax purposes, the use of such instruments would increase.\(^{329}\)

\(^{328}\) The discussion in the text assumes that the index used for the debt instrument was the same as the index used by the Code to determine income. It is unlikely that issuers would choose to use a different index at the cost of substantially increased complexity. It would also be possible for the Code to respect the use of different indices as long as they met certain general criteria.

\(^{329}\) Treasury generally has opposed the issuance of indexed Treasury obligations. In testimony, Treasury noted that both the interest payments and the indexation adjustments to an indexed obligation currently would be taxable under the OID rules. Treasury strongly opposed making the inflation adjustment tax-free on such bonds while the implicit inflation adjustment remains taxable on other obligations. Inflation-Indexed Treasury Debt as an Aid to Monetary Policy: Hearings Before the Subcomm. on Commerce, Consumer, and Monetary Affairs of the House Comm. on Government Operations, 102d Cong., 2d Sess. 105-21 (1992) (statement of Jerome H. Powell, Under Sec. of Treas. for Finance).

During the 1980’s, the Department of Housing and Urban Development (HUD) was involved in developing a self-amortizing indexed residential mortgage called a Price Level Adjusted Mortgage (PLAM). Under a typical PLAM, a borrower’s monthly mortgage payment initially would be determined based on the amortization schedule for a 4% mortgage. At regular intervals, both the monthly payment and the remaining principal balance would be indexed to changes in the consumer price index. From a borrower’s perspective,
5. **Home Mortgages**

The administrative problems of indexing home mortgage debt are not particularly severe. The determination of the amount of interest paid on a home mortgage is, even without indexing, beyond the ability of most homeowners and is dealt with successfully by lender reporting.\(^{330}\) Given the existing reporting requirements, the marginal cost of requiring lenders to report indexing adjustments is quite small.\(^{331}\) Optimally, an adjustment should be based on the average balance of the mortgage during the year. For most level-payment, self-amortizing mortgages, little accuracy would be lost by indexing based only on the ending balance with appropriate adjustments for mortgages outstanding for less than an entire year.

The real problem with indexing home mortgage debt is political. As the following example demonstrates, indexing home mortgage debt would limit the benefit of the home mortgage deduction significantly.

*Example 36:* A taxpayer in the 36% bracket has a 30-year, $200,000 mortgage at 10%. Under current law, the after-tax cost of the interest on the mortgage in the first year is ap-

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PLAMs would have offered the advantage of low initial mortgage payments, while from a lender's perspective, PLAMs would have been attractive investments for entities, such as pension plans, with liabilities that themselves are linked to inflation. The Service issued temporary regulations treating PLAMs as variable rate debt instruments. Temp. Reg. § 1.1275-6T (withdrawn Feb. 2, 1994). HUD, however, never gave final approval to the Federal Housing Administration insuring PLAMs. *A Caution From Kemp, Money,* July, 1990, at 11. Despite HUD's failure to go ahead with PLAMs, at least one private company has originated PLAMs. *PLAMs Make Comeback,* Nat’l Mortgage News, Feb. 18, 1991, at 11.

\(^{330}\)IRC § 6050H (requiring reporting to the Service and the borrower the amount of interest paid on home mortgages).

\(^{331}\)Nevertheless, it is likely that lending institutions would resist any such reporting requirement in the same way that they resisted a proposal to have lenders report average balances on mortgages so as to assist with compliance with § 163(h)(3) (limitation on home mortgage interest). See Announcement 87-73, 1987-33 I.R.B. 39 (Aug. 17, 1987) (announcing that the Service intends to issue regulations requiring lending institutions and other parties to report the average balance on home mortgages); Letter from Wendy S. Schonman, Tax Counsel, National Council of Savings Institutions to Lawrence Gibbs, Commissioner of the Internal Revenue Service, 87 TNT 190-28, Sept. 30, 1987, available in LEXIS, Fedtax Library, TNT File (requesting a postponement of the average balance reporting requirement); BNA Daily Report for Executives G3 (Aug. 24, 1987), 87 TNT 171-12, Sept. 2, 1987, available in LEXIS, Fedtax Library, TNT File (reporting the objections of the American Bankers Association and the Consumers Bankers Association to the average balance reporting requirement); Announcement 87-110, 1987-49 I.R.B. 37 (Dec. 7, 1987) (announcing that the average balance reporting requirement would not be imposed for interest received before January 1, 1989); and Announcement 89-61, 1989-20 I.R.B. 146 (May 15, 1989) (announcing that the average balance reporting requirement would be indefinitely postponed).
proximately $12,800. Assuming 5% inflation, if the mortgage were indexed, the after-tax cost would be approximately $16,400, a 28% increase.

Even if, as is likely, indexing applied only to new mortgages, by raising the after-tax cost to homebuyers, indexing mortgages might well depress housing prices causing existing homeowners to suffer losses. It is, of course, possible that mortgage interest rates would fall to reflect the lower taxes on lenders. It is not at all clear, however, that interest rates would fall enough to offset the entire burden of indexing. In \textit{Example 35}, interest rates would have to fall from 10% to 7.2% to compensate the homeowner for indexing.

The question of the effect of indexing on existing homeowners is part of a much larger problem of transition rules. Even, for example, if it is accepted that the current subsidy for housing has caused inefficient overinvestment in housing stock and is distributionally suspect, care must be given to reducing the subsidy without causing excessive dislocation. To use the transition problem as a permanent bar to improvements in the tax system, however, makes little sense. All

\begin{itemize}
  \item[332] The interest payable in the first year would be approximately $20,000. ($20,000 = 200,000 \times 10\%). The $20,000 interest payment would be entirely deductible and would save the taxpayer $7,200 in taxes ($7,200 = 36\% \times 20,000). The after-tax cost therefore would be $12,800 ($12,800 = 20,000 - 7,200).
  \item[333] A $10,000 inflation adjustment would reduce the $20,000 first year interest payment ($10,000 = 200,000 \times 5\%). The remaining $10,000 interest deduction would save the taxpayer $3,600 in taxes ($3,600 = 10,000 \times 36\%). The after-tax cost therefore would be $16,400. $16,400 is approximately 28\% greater than $12,800 (28\% = (16,400 - 12,800)/12,800).
  \item[334] The current federal income tax treatment of housing generally is assumed to subsidize housing significantly. See, e.g., Treasury Dep't, Report On Integration of the Individual and Corporate Tax Systems: Taxing Business Income Once 127 (1992) (noting that among major categories, the cost of capital is lowest for owner-occupied housing); Harvey S. Rosen, Public Finance 113 (3d ed. 1992) (noting the magnitude of the federal subsidy for housing and questioning the arguments in favor of such a subsidy and its distributional effects); Patrie H. Hendershott, Tax Reform and the Slope of the Playing Field, in Taxes and Capital Formation 51 (Martin Feldstein ed., 1987) (showing that the cost of capital is lowest for owner-occupied housing and arguing that it is inefficient); Fullerton, note 233, at 25 (showing that the cost of capital is lowest for owner-occupied housing); Let's Slay Another Sacred Tax Cow, N.Y. Times, Apr. 17, 1981, at A24 (arguing in favor of limiting the federal tax subsidy for housing).
  \item[335] See text accompanying notes 357-84.
  \item[336] At a 7.19\% interest rate in \textit{Example 35}, the homeowner's pretax interest cost would be $14,375. Taking into account the $10,000 indexing adjustment, his interest deduction would be $4,375, which would give him a tax savings of $1,575. His after-tax cost would be, therefore, $12,800.
\end{itemize}
actions of government, whether legislative, administrative or judicial, create winners and losers. To suggest that improvements cannot be made because there will be losers in the process of change would freeze the status quo in an unacceptable manner and prevent beneficial changes. Nevertheless, abrupt change can have significant real costs and should be avoided where practical. Thus, in introducing indexing, as with other changes to the tax law, care should be given to avoiding unnecessary disruption. In particular, in some circumstances, grandfathering of existing assets and liabilities and gradual phase-ins of indexing provisions would be appropriate. In addition, the overall distributional impact of indexing should be examined and adjustments in rate schedules should be made as appropriate.

If it were decided to exclude home mortgage borrowers from indexing, it would not necessarily be correct also to exclude home mortgage lenders. If, for example, a bank’s obligations were indexed (thereby reducing its interest deductions), but the mortgages it held as assets were not, its income would be grossly overstated.\(^ {338}\) Thus, if all assets and liabilities were indexed other than home mortgage debt, there still would be strong arguments in favor of indexing home mortgage debt on the lender’s side. Of course, indexing home mortgages for lenders, but not for borrowers, would have a significant revenue cost. The cost, however, would be an accurate reflection of the cost of subsidizing home ownership.

6. **Consumer Debt**

Indexing consumer debt, such as credit cards and personal lines of credit, should not impose significant burdens on the tax system. From the borrower’s side, interest on such debt generally is not deductible; as a result, no indexing is required.

From the lender’s side, conventions could be adopted to simplify indexing. For example, it would be reasonable to index based on the average balance of the debt during the taxable year. Since interest on consumer debt generally is based on average balance, most lenders already track this information. The incremental burden of multiplying the average balance times the inflation factor would be small.

7. **Bank Deposits**

As with consumer credit, bank deposits could be indexed based on their average balances. From the bank’s perspective, indexing would

\(^ {338}\) Even if overall interest rates did not drop under indexation, it is likely that home mortgage rates would be higher relative to other interest rates if home mortgages were the only form of debt not indexed for lenders.
require the incremental burden of tracking average balances. The indexing adjustment for the depositor generally would be the same as for the bank and could be reported by the bank easily along with the gross amount of interest paid.\textsuperscript{339} In the case of checking accounts, the amount of the indexation adjustment to the consumer could be limited to the amount of interest paid as an ad hoc method of accounting for the income from services provided by the bank.\textsuperscript{340}

8. Government and Corporate Bonds

Indexing would pose a small incremental burden on issuers of corporate bonds and no additional burden on issuers of government bonds. The administrative details of indexing could prove troublesome for individual holders of corporate and government bonds due to complexity. To a large extent, however, the burden could be placed on the broker community, though the costs of doing so should be evaluated carefully. In particular, in order to know the correct indexing adjustment, a broker would need to know the holder’s basis in the bond. Currently, brokers do not always know the holder’s basis and therefore, additional reporting rules would be required.\textsuperscript{341}

9. De Minimis Rules

De minimis rules could simplify the burden of indexing in the case of small debts and would be particularly appropriate for purposes of small debts between individuals. Thus, for example, no indexing could be required on loans between individuals of less than $10,000.\textsuperscript{342} Similarly, de minimis rules could be explored for a broader class of loans where one or more parties is not an individual. In designing de minimis rules, it is important to remember that it is not necessary that both the borrower and the lender be treated symmetrically.\textsuperscript{343}

\textsuperscript{339} Banks are required to report interest paid on Form 1099. IRC § 6049.
\textsuperscript{341} If brokers were required to know basis, it would be a small incremental burden to require brokers to report gain and loss on the sale of bonds, rather than just gross proceeds. Cf. IRC § 6045 (requiring brokers to report gross proceeds). See text accompanying note 150 (recommending reporting of gain on mutual fund shares).
\textsuperscript{342} Cf. IRC § 7872(c)(2) ($10,000 de minimis exception for certain below-market loans).
\textsuperscript{343} Compare § 163(h)(1) (disallowing a deduction for interest on debt used for personal purposes) with § 61(a)(4) (including interest in income without regard to the use of the proceeds of the debt).
D. Use of Approximate Indexation

Just as indexing capital gains can be approximated by the use of an exclusion, indexing debt can be approximated by the use of a partial interest exclusion. For example, as part of its 1984 tax reform proposals, Treasury recommended the use of a fractional exclusion method.\textsuperscript{344} Under the Treasury methodology, lenders and borrowers would have excluded a specified fraction of their interest income or expense each year. The fraction, which would have been the same for all taxpayers, would have been determined annually based on the rate of inflation and an assumption as to the real interest rate.\textsuperscript{345} Table 7 shows the fractional exclusions under the Treasury proposal as a function of the inflation rate.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
\textbf{Inflation Rate} & \textbf{Fractional Exclusion} \\
\textbf{\%} & \textbf{\%} \\
0 & 0 \\
1 & 14 \\
2 & 25 \\
3 & 33 \\
4 & 40 \\
5 & 45 \\
6 & 50 \\
7 & 54 \\
8 & 57 \\
9 & 60 \\
10 & 62 \\
11 & 65 \\
12 & 67 \\
\hline
\end{tabular}
\caption{Fractional exclusion assuming 6\% real interest rate}
\end{table}

As with a capital gains exclusion, a fractional exclusion has the advantage of simplicity and the disadvantage of being inexact.\textsuperscript{346}

\begin{itemize}
\item \textsuperscript{344} 2 Treasury I, note 152, at 193-200.
\item \textsuperscript{345} The proposed fractional exclusion was equal to the inflation rate divided by the assumed nominal interest rate based on a 6\% real interest rate. Id. at 195-98. Treasury apparently computed the fractional exclusion based on the assumption of continuous compounding. See note 303 (discussing continuous compounding).
\item \textsuperscript{346} Although a fractional exclusion for debt is inexact, it is superior to a capital gains exclusion for several reasons. First, because debt instruments generally are taxed currently, there is no need to compensate for deferral, and the size of the appropriate exclusion does not change with the holding period. Second, the fractional exclusion takes into account changes in the rate of inflation. Third, although the fractional inclusion fails to
\end{itemize}
The principal problem with a fractional exclusion is that it does not take into account differences in real rates of return. For example, with a 5% inflation rate and a 6% real interest rate, the fractional exclusion as shown in Table 7 would be 45%. If the real rate, however, were only 2%, the correct fractional exclusion would be 71%, and if the real rate were 10%, the correct fractional exclusion would be only 33%. As can be seen from the following example, the failure of a single fractional exclusion to take into account differences in real rates of return is particularly acute in the case of financial institutions.

Example 37: Bank Co has deposits of $1 million on which it pays 3% interest and has consumer loans outstanding of $1 million on which it is paid 18% interest. The inflation rate is 5%. In nominal terms, Bank Co has interest income of $180,000, interest expense of $30,000 and net income of $150,000. In real terms, moreover, its income is also $150,000, because its inflationary loss of $50,000 on its assets is exactly offset by its inflationary gain of $50,000 on its liabilities.

Under a fractional exclusion of 45%, however, Bank Co would be able to exclude 45% of its gross income, or $81,000, but would lose only 45% of its interest expense, or $13,500. In net terms, it would be able to exclude $67,500 of its net income. Its taxable income, therefore, would be only $82,500, rather than $150,000.

Thus, in Example 37, the bank’s real income would be underreported by 45%, the full amount of the fractional exclusion. To the extent that the financial institution was equity financed, the understatement of its income would be reduced, but not eliminated.

take into account differences in real yield, the range of real yield generally is smaller for debt instruments than it is for other capital assets. Additionally, because, unlike the capital gains exclusion, the fractional exclusion applies to both sides of a transaction, the market may have some ability to correct for errors in the exclusion rate. Of course, a capital gains exclusion is politically more popular than a fractional exclusion for debt because the capital gains exclusion generates only winners, whereas the fractional exclusion generates losers as well as winners.

See 2 Treasury I, note 152, at 198 (noting that a correct fractional exclusion would take into account the difference in real rates between lenders, but arguing that a single fractional exclusion is more accurate than no exclusion).

71% = 5%/((2% + 5%) + 5%). 33% = 5%/((10% + 5%) + 5%). See note 345 (explaining computation of the fractional exclusion).

For simplicity, the bank is assumed to have no equity.

50,000 = $1,000,000 × 5%.
One possible solution to the financial institution problem would be to require financial institutions to use exact indexing, while permitting other taxpayers to use a fractional exclusion. Any such proposal would require distinguishing between financial and nonfinancial institutions. Alternatively, a fractional exclusion could be permitted only for individuals and small entities, while all other entities could be required to use exact indexing.

A fractional exclusion also does not work very well with debt that is not paying a current interest rate. For example, consider a taxpayer who buys a debt instrument in the secondary market with a 5% coupon and a yield of 10%. Presumably, the fractional exclusion should be applied against his entire nominal income from the debt. Since, however, a portion of his income is deferred until maturity, it would be difficult to do so. Similarly, a fractional exclusion does not work well when the inflation rate changes after a debt instrument is purchased. For example, consider a taxpayer who holds a debt instrument paying 6% that was purchased when the inflation rate was zero. If inflation increases to 5% and the taxpayer's real yield drops to 1%, he should get a fractional exclusion of 83%. He would be permitted, however, a fractional exclusion of only 45%. Finally, consider a taxpayer who holds a debt instrument paying 16% while inflation is 10%. If inflation drops to 2% and his real yield increases to 14%, he should have a fractional exclusion of 13%. Under the Treasury proposal, however, he would be permitted to exclude 25% of his interest income.

These examples are not intended to suggest that approximations are inappropriate. After all, the current system can be viewed as one where the fractional exclusion is always zero. Rather, the examples are intended to suggest that any approximations need to be designed with great care and may need to take into account some differences in circumstances.

351 It would be possible to distinguish between financial institutions and nonfinancial institutions based on the percentage of their income from interest or the percentage of their assets in interest-bearing obligations.
352 The taxpayer could elect to accrue market discount currently, IRC § 1278(b), thereby becoming entitled to the entire fractional exclusion. It also would be possible to apply the fractional exclusion against the current coupon income from the bond and also against the market discount income recognized upon disposition. IRC § 1276 (requiring taxpayers to treat market discount as ordinary income upon disposition).
353 83% = 5%/ (1% + 5%).
354 13% = 2%/(14% + 2%).
355 See Table 7.
E. Is Debt Indexation Unnecessary?

The discussion of debt indexation so far essentially has ignored the effect of the failure to index debt on pretax interest rates. Opponents of debt indexation argue that because both lenders and borrowers understand that their tax liabilities are based on nominal, not real, interest payments, interest rates adjust to take into account the overtaxation and that, therefore, indexation becomes unnecessary.356 The theoretical ability of interest rates to adjust to take into account the failure to index interest is demonstrated by the following example.

Example 38: Assume that both the real interest rate and the inflation rate are 5% and that all taxpayers face a 30% marginal rate. Well aware of monetary illusion, but blind to fiscal illusion, Bank Co. sets its lending rate at 10% to cover both the real cost of its funds and inflation.357 Bank Co. lends $1,000 to Borrower for one year. Bank Co. expects to earn an after-tax real return of $35.358

After one year, Borrower repays $1,100. Bank Co. pays taxes of $30359 on the interest, leaving itself with $1,070 after taxes. Its accountant points out that after adjusting for the

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356 For example, the committee report to the House Bill noted that “[t]he basis of debt is not indexed in order to avoid the complexity required to provide an inflation adjustment for both parties to the transaction.” H.R. Rep. No. 461, note 73, at 357. The committee report to the indexing bill passed by the House in 1978 went further and argued that “[t]o the extent that inflation is anticipated correctly and interest rates are free to rise in the marketplace, the market interest rates should rise to reflect the fact that neither the borrower nor the lender must make the inflation adjustment.” H.R. Rep. No. 1445, note 73, at 126, reprinted in 1978-3 C.B. (vol. 1) at 181, 300. Frederic W. Hickman argues that:

[i]t is quixotic to enact elaborate mechanisms that affect the bulk of taxpayers in petty but complicating ways in order to correct ‘theoretical’ lapses, unless there is a persuasive showing of damaging distortions or clear unfairness."

Id. at 803. But see id. at 811 (comments by John E. Chapoton in panel discussion advocating indexing of interest even if it were not feasible to index other factors in the tax system).

357 For purposes of clarity, the example ignores the term $r \times \pi$ in the Fisher and tax-adjusted Fisher equations. See Equations (4) and (7).

358 Absent inflation, Bank Co. would earn 5% before taxes and 3.5% or $35 after taxes. 3.5% = 5% × (1 - 30%).

359 $30 = $100 \times 30\%$. 
No longer subject to fiscal illusion, Bank Co. raises its lending rate to 12.2%, charging $122 interest on its $1,000 loan to Borrower. After paying $37 in taxes, Bank Co. is left with $85 after tax. Adjusting for its $50 inflationary loss, Bank Co. has an after-tax real return of $35 or 3.5%. Similarly, Borrower has an after-tax real interest cost of $35.

As shown by the example, in order to have an interest rate sufficient to compensate both for the effect of inflation and for the failure of the tax system to index debt, a lender must set an interest rate that is high enough to cover the real interest rate, expected losses due to inflation and the tax penalty on the inflation premium. Thus, a lender planning to lend $P$ who demands a real pretax return of $r$, expects an inflation rate of $\pi^e$ and has a tax rate of $\tau$, must set an interest rate of $i$, such that the after-tax present value of the interest and principal payments, stated in constant dollars, equals the amount lent. In other words, $i$ must satisfy the following equation:

$$P = \frac{P \times (1 + i(1 - \tau))/(1 + \pi^e)}{(1 + r(1 - \tau))}$$

Equation (6) can then be solved for $i$:

$$i = r + \frac{\pi^e}{(1 - \tau)} + (r \times \pi^e)$$

If $r$ and $\pi^e$ are small, their product $r \times \pi^e$ can be ignored, leading to the tax-adjusted Fisher equation.

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360 Bank Co.’s inflationary loss is $1,000 times 5%, or $50.
361 $85 = $122 - ($122 \times 30%).
362 $35 = $85 - $50 = $1,000 \times 3.5%.
363 The analysis for the borrower is exactly symmetrical to the analysis for the bank.
365 Equation (8) is exactly correct if the inflation rate and the real rate are compounded continuously. See note 303 (discussing compounding).
Equations (7) and (8) differ from equations (4) and (5) in that the term \( \pi' \) has been replaced by the term \( \pi'/(1 - \tau) \). The coefficient \( 1/(1 - \tau) \) can be thought of as grossing up the inflation adjustment to cover taxes. Since \( \tau \) is always less than one, \( 1/(1 - \tau) \) will always be greater than one and, therefore, the interest rate determined by the tax-adjusted Fisher equation will always exceed the rate determined by the unadjusted Fisher equation. The application of the tax-adjusted Fisher equation is straightforward. For example, if, as in Example 38, \( r \) and \( \pi' \) are 5% and \( \tau \) is 30%, the interest rate would have to be 12.2% in order to compensate the lender on an after-tax basis for inflation.\(^{366}\)

Some argue that if interest rates fully adjust to compensate for the lack of indexation, debt indexation is unnecessary, and since debt indexation has a significant administrative cost, it should not be done.\(^{367}\) In essence, the argument is that since no one, including the fisc, is hurt by the failure to index, indexation is just an academic exercise not worth the administrative cost.\(^{368}\) The tax-adjusted Fisher equation does not, on the other hand, imply that debt indexation would be incorrect, at least in equilibrium. If debt were indexed, there would be no need or incentive for the market to adjust interest rates for the failure to index and the Fisher equation again would be expected to hold. Therefore, it would not be incorrect to make the indexation adjustment. It is only in the absence of indexation that interest rates include the tax factor and that, therefore, indexation is unnecessary. The argument against indexation of debt is thus two-fold. First, as a transition matter, current interest rates include the tax factor and, therefore, in the short run, indexation is incorrect and would lead to windfall gains and losses.\(^{369}\) Second, in the long run, the administrative cost of indexation is unnecessary.

\[^{366}\] \( 12.2\% = 5\% + 5\%/\left(1 - 30\%\right) \).

\[^{367}\] See note 356 (describing reasons for excluding debt from legislation indexing capital gains). Implicit in the argument against debt indexation is an argument for capital gains indexation. Essentially, the argument is that if debt indexation is unnecessary, capital gains indexation can be adopted without fear of tax arbitrage. See Section X.A (discussing partial indexing).

\[^{368}\] The fisc is presumed not to be hurt by the failure to index because it is assumed that both the borrower and the lender face the same marginal tax rate and, therefore, the borrower's excess deduction is exactly compensated for by the lender's excess inclusion. But see text accompanying note 372 (discussing the fact that borrowers and lenders often will face different marginal rates).

\[^{369}\] See Mick, note 291, at 2078-85 (discussing possible transition rules).
Even if it were correct that borrowers and lenders take taxes into account, that is, there is no fiscal illusion, there remain strong arguments in favor of debt indexation. First, the tax-adjusted Fisher equation implies that interest rates would be more volatile without indexation. With indexation, the Fisher equation implies that a 1% increase in inflation will increase interest rates by 1%. Without indexation, the tax-adjusted Fisher equation implies that a 1% increase in inflation will increase interest rates by \(1/(1 - \tau)\)%.

Therefore, if the marginal tax rate is, for example, 34%, a 1% increase in inflation will increase interest rates by approximately 1.5%. Presumably, there are real costs to the increased volatility of interest rates.

Second, the derivation of the tax-adjusted Fisher equation assumes that all borrowers and lenders have the same marginal tax rate, \(\tau\). As is well known, this assumption is false because different taxpayers generally face different marginal tax rates. Moreover, any given taxpayer may face different marginal rates with respect to different debts. Thus, there can be no unique interest rate that solves Equation (8).

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370 See Equation (5) (Fisher equation).
372 For example, increased volatility of nominal interest rates imposes risks on borrowers and lenders. Moreover, in order to reduce such risks, borrowers and lenders must engage in costly hedging strategies thereby incurring significant transaction costs. The Fiscal Affairs Department of the International Monetary Fund noted that increased volatility means increased uncertainty and that:

\[\text{an increase in such uncertainty entails risk for savers and investors for which they must be compensated. Viewed in this way, increased uncertainty attendant upon increased volatility of interest rates represents an additional cost of capital formation that lowers productivity growth and growth of real output and, in turn, enhances inflationary pressures.}\]

IMF Report, note 364, at 37.
373 For example, corporations are taxable at marginal rates from zero to 35% and individuals are taxable at marginal rates from zero to 39.6%, while pension funds and foreign persons generally face a marginal rate of zero on interest income and expense. IRC § 11 (corporations); IRC § 1 (individuals); IRC § 501(a) (pension funds); IRC § 871(h) (portfolio interest received by nonresident alien individuals); IRC § 881(c) (portfolio interest received by foreign corporations).
374 For example, consider an individual who has five debts outstanding. The first debt is used for personal purposes, the second to purchase a passive investment that is not currently generating income, but is expected to generate income in the future, the third to purchase an investment, the fourth to purchase a home and the fifth for business purposes. Interest on the first debt would be nondeductible. IRC § 163(h)(1) (personal interest). Interest on the second debt would be nondeductible currently, but may be deductible in the future in computing adjusted gross income. IRC § 469 (passive losses). Interest on the third debt may or may not be deductible currently depending on the individual's investment income and, when deductible, would be available only as an itemized deduction. IRC § 163(d) (investment interest). Interest on the fourth debt generally would be deduct-
tion (6) for all borrowers and lenders. Given a real interest rate, \( r \), expected rate of inflation, \( \pi^e \), and nominal interest rate, \( i \), a break even tax rate, \( \tau^* \), can be defined as the marginal tax rate that implicitly satisfies Equation (6). Rearranging the terms of Equation (6), \( \tau^* \) can be expressed as follows:

\[
\tau^* = 1 - \frac{\pi^e}{(i - r - \pi^e)}
\]  

(9)

If a borrower has a marginal tax rate less than \( \tau^* \), her ability to deduct nominal interest is of reduced value and, therefore, she faces a higher real borrowing cost than she would with indexation. Conversely, a borrower with a marginal tax rate greater than \( \tau^* \) faces a lower real borrowing cost without indexation. Similarly, lenders with marginal tax rates greater than \( \tau^* \) receive lower real returns than they would with indexation and lenders with marginal tax rates less than \( \tau^* \) receive higher real returns. These differences both raise issues of equity and create deadweight loss by distorting borrowing and lending decisions.\(^{375}\) For example, lower income individuals generally will have lower marginal tax rates than will higher income individuals. As a result, lower income individuals will face higher real borrowing costs than will higher income individuals with respect to deductible loans. Efficiency issues are raised by the fact that the tax penalty on interest income will encourage institutions and individuals with low marginal rates to become net lenders and institutions and individuals with high marginal rates to become net borrowers.

In addition to the theoretical critiques of the argument that debt indexation is unnecessary because market forces are able to adjust for the failure to index, there is also a strong empirical critique. The empirical work suggests that \( \tau^* \) is not significantly different from zero, in other words, that market interest rates have not adjusted to take into account the payment of taxes on the inflation component of interest.\(^{376}\) In terms of the debate between the Fisher equation (Equation...
5) and the tax-adjusted Fisher equation (Equation 8), the Fisher equation appears to be a much more accurate representation of reality.\(^{377}\)

If market rates have not adjusted to take the inflation tax penalty into account, then real after-tax interest rates are affected strongly by inflation. Therefore, the argument against indexing based on the fact that for every debt there is both a borrower and a lender becomes, at best, an argument about revenue neutrality: Borrowers are helped by the tax penalty, lenders are hurt by the tax penalty, but at least the fisc

of Inflation, 65 Am. Econ. Rev. 269, 282 (1975) (concluding that real short-term interest rates were constant during the period 1953-71 and that nominal rates reflected all available information on future rates); Martin Feldstein & Lawrence H. Summers, Inflation, Tax Rules, and the Long-Term Interest Rate, 1978 Brookings Papers on Econ. Activity 61 (arguing nominal rate changes less than one for one with inflation); Patrick J. Hess & James L. Bickster, Capital Asset Prices versus Time Series Models as Predictors of Inflation, 2 J. Fin. Econ. 341, 359 (1975) (rejecting Fama's conclusions that the expected real interest rate is constant and that short-term rates fully reflect the expected rate of inflation); Charles R. Nelson & G. William Schwert, Short-Term Interest Rates as Predictors of Inflation: On Testing the Hypothesis that the Real Rate of Interest is Constant, 67 Am. Econ. Rev. 478, 485 (1977) (rejecting Fama's conclusion that the expected real interest rate is constant and that short-term rates fully reflect the expected rate of inflation); Lawrence Summers, The Nonadjustment of Nominal Interest Rates: A Study of the Fisher Effect in Macroeconomic Prices and Quantities: Essays in Memory of Arthur Okun 201, 207, 214 (James Tobin ed., 1983) [hereinafter Nominal Interest] (using a simple general equilibrium model to show the effect of inflation on real interest rates and concludes that “there is little reason to expect any stable relation between short-term movements in interest rates and inflation,” id. at 207, and that there is “a very weak relationship between long swings in the rate of inflation and nominal interest rates,” id. at 225); Vito Tanzi, Inflationary Expectations, Economic Activity, Taxes, and Interest Rates, 70 Am. Econ. Rev. 12, 20 (1980) (an empirical study concluding that during the 1952-75 period, the fact that income taxes reduced the net-of-taxes expected real rate of interest had no effect on market interest rates).

\(^{377}\) There are many reasons why the tax-adjusted Fisher model may not hold. Real interest rates may be affected by the same macroeconomic factors that affect inflation; inflation may increase the taxation of equity, thereby driving down the real interest rate; inflation may increase the taxation of inventories and depreciable property, thus reducing the demand for debt; the marginal holders of debt may be tax-exempt entities or foreign persons; and the presence of government debt and debt management policies may affect the real interest rate. See IMF Report, note 364, at 16-19, 21-22 (suggesting reasons why the tax-adjusted Fisher equation would not hold); Martin Feldstein suggests that the basic Fisher model holds because of:

(1) the additional tax burdens caused by inflation because of historic cost depreciation and inventory accounting rules; (2) the role of equity financing and the taxation of the return to equity; (3) the presence of government debt and debt management policies; and (4) the presence of other debt instruments that are not affected by inflation in the same way as the corporate bond market but that are close substitutes for corporate bonds in investors' portfolios (i.e., residential mortgages, state and local bonds, foreign bonds).

Martin Feldstein, Inflation, Tax Rules, and Capital Formation 20 (1983); see also Martin Feldstein, Tax Rules and the Mismanagement of Monetary Policy, 70 Am. Econ. Rev. Papers & Proc. 182, 182 (1980) (arguing that interest rates have not risen as high as predicted by the tax-adjusted Fisher equation because of Federal Reserve Board policies); Summers, Nominal Interest, note 376, at 201 (suggesting reasons why the tax-adjusted Fisher equation would not hold).
is kept whole. Even, however, the claim that there is no revenue cost from failing to index debt collapses when it is recognized that borrowers and lenders face different marginal rates. The failure to index debt has already put strong pressure on the tax treatment of debt and as a result, the rules concerning the tax treatment of interest already have been changed significantly to limit the ability to deduct the inflationary component of debt. Thus, for individual borrowers, the disallowance of consumer interest, the investment interest limitation, the at-risk rules, and the passive loss rules all can be seen as ad hoc measures necessary in part to cope with the overstatement of interest expense and the resulting tax arbitrage opportunities. In the case of corporations, much of the pressure on the debt-equity distinction is due to the failure to index interest deductions. Indexing debt

378 Using 1981 data, Eugene Steuerle estimated that the aggregate federal income taxes saved by deducting interest exceeded the aggregate federal income taxes paid on interest income by $61 billion. Steuerle, Tax Arbitrage, note 340, at 1008. The relative imbalance between interest deduction and interest inclusion is likely to have fallen given the restrictions on interest imposed by the 1986 Act. See Tax Reform Act of 1986, Pub. L. No. 99-514, § 511(a) (amending IRC § 163(d) to no longer permit the deduction of $10,000 of investment interest in excess of net investment income); § 511(b), 100 Stat. at 2246-48 (amending IRC § 163(h)) (eliminating the deduction for personal interest); § 501(a), 100 Stat. at 2233-41 (adding IRC § 469) (restricting the deductibility of interest allocable to passive activities). See also IRC § 163(i) (limiting the deductibility of interest on certain high-yield discount obligations); IRC § 163(j) (limiting the deductibility of certain interest paid to related foreign persons).

379 IRC § 163(h).

380 IRC § 163(d).

381 IRC § 465.


383 See generally Alan J. Auerbach, Should Interest Deductions Be Limited?, in Uneasy Compromise, note 103, at 208-18 [hereinafter Interest Deduction] (discussing limiting interest deductions to restrict tax arbitrage); see generally Steuerle, Tax Decade, note 37, at 30-36 (discussing the role of the failure to index for inflation in arbitrage transactions and tax shelters); Steuerle, Taxes, note 382, at 58-80, 95-106 (same).

384 See IRC § 385 (authorizing Treasury to promulgate regulations providing rules to determine whether an interest in a corporation is to be treated as stock or indebtedness). Treasury has tried but failed to issue regulations under § 385. Final regulations originally were promulgated on December 31, 1980, with a prospective effective date of April 30, 1981. See T.D. 7747, 1981-1 C.B. 141. In response to public comments, Treasury several times postponed the effective date of the regulations, see T.D. 7774, 1981-1 C.B. 168; T.D. 7801, 1982-1 C.B. 60; T.D. 7822, 1982-2 C.B. 84; proposed modifications, see Notice of Proposed Rulemaking LR-75-81, 1982-1 C.B. 531, and finally simply withdrew the regulations on August 5, 1983, see T.D. 7920, 1983-2 C.B. 69. Congress subsequently has expanded Treasury’s authority under § 385 by permitting regulations to treat an interest in a corporation as part debt and part stock. IRC § 385(a) (as amended by Omnibus Budget Reconciliation Act of 1989, Pub. L. No. 101-239, § 7208(a)(1), 103 Stat. 2106, 2337). Regulations taking advantage of the increased authority have yet to be issued. More recently, Congress modified § 385 to provide that when a corporation has identified an interest in the corporation as either stock or indebtedness, a holder of such an interest must disclose
would take significant pressure off the tax system by reducing both the value of the interest deduction and the cost of holding debt.

X. INDEXING ASSETS but not LIABILITIES: The Problem of Arbitrage

A. Partial Indexation

While in many respects, the case for indexing liabilities is as strong, if not stronger, than the case for indexing assets, the political reality is that there is pressure to index assets without indexing liabilities.\(^\text{385}\) For example, the indexing proposal in the 1989 House Bill indexed assets without liabilities.\(^\text{386}\) More recently, there was significant pressure on Treasury to issue regulations that would have permitted indexing of capital gains without dealing with liabilities.\(^\text{387}\) The primary

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\(^{385}\) By the term “assets,” I mean assets other than debt instruments. By the term “liabilities,” I mean debt instruments with respect to both the borrower and the lender.

\(^{386}\) H.R. 3299, note 73.

\(^{387}\) The public debate over indexing capital gains by regulation began with a column by Paul Roberts and an editorial in the Wall Street Journal and was supported by a study commissioned by the National Taxpayers Union Foundation and the National Chamber Foundation. Paul Craig Roberts, Instant Way to Cut Capital Gains Tax?, Wash. Times, Jan. 22, 1992, at F1 (claiming that President Bush had the authority to index capital gains by regulation); Presidential Indexation, Wall St. J., Jan. 28, 1992, at A1 (urging President Bush to issue regulations indexing capital gains); Charles J. Cooper, Michael A. Carvin & Vincent Colatriano, Memorandum: The Legal Authority of the Department of the Treasury to Promulgate a Regulation Providing for Indexation of Capital Gains (Aug. 17, 1992), 92 TNT 175-43, Aug. 27, 1992, available in LEXIS, Fedtax Library, TNT File (providing a detailed legal argument for the proposition that the President has the authority to index capital gains by regulations defining the term “cost”). The memorandum was later published as an article in the Virginia Tax Review. Charles J. Cooper, Michael A. Carvin & Vincent J. Colatriano, The Legal Authority of the Department of the Treasury to Promulgate a Regulation Providing for Indexation of Capital Gains, 12 Va. Tax Rev. 631 (1993). Despite an opinion of the General Counsel of the Treasury that such a regulation would be invalid and opposition from the bar and other sources, President Bush apparently seriously considered directing the Treasury to issue such a regulation. See Memorandum from the Office of Legal Counsel, Memorandum for Jeanne S. Archibald, Re: Legal Authority of the Treasury to Issue Regulations Indexing Capital Gains for Inflation, 16 Op. Off. Legal Counsel 145 (Sept. 1, 1992) (hereinafter Memorandum for J.S. Archibald); N.Y. St. Bar Ass’n, Tax Sec., Memorandum in Opposition to Proposal to Index Capital gains for Inflation by Regulation (Feb. 13, 1992), 92 TNT 49-41, Mar. 4, 1992, available in LEXIS, Fedtax Library, TNT File (arguing that indexing by regulation would be “terrible tax policy” and would be invalid); Harry G. Gourevitch, Congressional Research Service Report for Congress: The Question of Indexing Capital Gains by Regulation (Mar. 18, 1992), 92 TNT 182-
reason that indexing assets is more popular than indexing liabilities is that, for the most part, indexing assets creates only winners, while indexing liabilities creates losers as well as winners. The secondary reason is complexity. Opponents of indexing debt argue that the two-sided nature of debt makes indexing both less necessary and more complex. Indexing assets without liabilities, however, enhances arbitrage opportunities. Thus, while in isolation, asset indexation may be a good idea, asset indexation is less attractive in a system in which there is unindexed debt.

To put the arbitrage problem in stark relief, consider a taxpayer entering into an entirely debt-financed transaction. A fully leveraged taxpayer would have equal amounts of inflationary gain on the asset side and inflationary loss on the liability side. Therefore, ignoring timing differences caused by the realization requirement, her net income is as accurately measured by making no corrections for inflation as it is by fully correcting for inflation. Correcting for inflation on the asset side while failing to correct for inflation on the liability side causes her net income to be seriously understated. The following example provides a numerical demonstration of the problems caused by partial indexation.

185, Sept. 8, 1992, available in LEXIS, Fedtax Library, TNT File (arguing that Treasury lacks authority to index by regulations); Lissa Fried, White House says Bush Considering Capital Gains Indexing, 92 TNT 181-3, Sept. 4, 1992, available in LEXIS, Fedtax Library, TNT File (reporting September 3, 1992, statement by White House spokesman Marlin Fitzwater that President Bush was considering issuing a regulation to index capital gains). President Bush finally rejected the idea of indexing by regulation after the Office of Legal Counsel issued an opinion agreeing with the Treasury opinion that the Treasury lacked that authority to issue such a regulation. Memorandum for J.S. Archibald, supra (opining that Treasury does not have the authority to index capital gains by regulation); White House News Release (Sept. 3, 1992), 92 TNT 182-6, Sept. 9, 1992, available in LEXIS, Fedtax Library, TNT File. Without regard to the Treasury's raw authority to issue such a regulation, the complexity of indexation as suggested by this Article indicates the imprudence in adopting indexation without appropriate legislative guidance. Moreover, even if Treasury had the authority to define the term “cost” in § 1012 to mean indexed cost, it is doubtful that Treasury would have the authority to deal with all of the collateral issues raised by indexation. See, e.g., note 409 and accompanying text (discussing the need for anti-arbitrage provisions if capital gains are indexed without indexing debt).

388 See note 356 (discussing congressional arguments that debt indexation is unnecessary). See also text accompanying notes 355-85 (discussing whether interest rates will adjust so as to make debt indexation unnecessary).

389 Indexing assets without liabilities also raises a variety of practical problems. For example, it requires distinguishing between assets that are and are not debt instruments. The determination of whether an asset is a debt instrument can be difficult. See text at notes 325-27 (discussing hybrid debt instrument) and note 384 (discussing § 385 and distinguishing between debt and equity). Additionally, holders of debt instruments potentially can avoid rules prohibiting indexation of debt instruments by holding the debt instruments in an entity, the interest in which is itself indexed. Partial indexation thus raises the necessity of developing rules designed to thwart such avoidance techniques.
Example 39: Margot buys an asset for $100, fully financing the purchase with debt. The debt bears a 15% nominal interest rate and the inflation rate is 10%. One year later, Margot sells the asset for $120, repays the debt with $115, and is left with $5.

No indexing: Without indexing, Margot has $20 of gain, a $15 interest deduction and net income of $5.

Comprehensive indexing:390 If both the debt and the asset were indexed, Margot would have gain on the asset of only $10391 and an indexed interest deduction of only $5.392 Her net income again would be $5.

Indexing assets but not liabilities: If only the asset were indexed, Margot would have a gain of $5 and an interest deduction of $15 and, therefore, a net loss of $10.

As Example 39 demonstrates, under some circumstances, indexing assets without liabilities produces the least accurate measurement of net income.

Comprehensive indexing and no indexing are only equivalent when the taxpayer’s basis in the indexed asset and the indexed liability are identical. More generally, where asset basis is in excess of liabilities, comprehensive indexing reduces taxable income as compared to no indexing and where asset basis is less than liabilities (as, for example, where liabilities are secured by appreciated property), comprehensive indexing increases taxable income.393 In either case, partial indexing has the effect of reducing taxable income relative to no indexing.

Opponents of debt indexation argue that implicit in the arbitrage critique of partial indexation is the assumption that interest rates have not been adjusted to take into account the lack of indexation.394 In particular, the argument is that once interest rates have adjusted, there is no real arbitrage; there is, at most, only the appearance of arbitrage. Thus, the argument would be that a borrower’s interest expense is implicitly indexed by virtue of the fact that she is forced to pay a higher pretax interest rate.395 Because the borrower’s interest expense is implicitly indexed, there is no reason why the income from her asset should not be explicitly indexed. Moreover, the increase in

390 I use the term “comprehensive indexing” to refer to indexing both debt and assets. I use the term “partial indexing” to refer to indexing assets without liabilities.
391 $10 = $120 – ($100 × 1.10).
392 $5 = $15 – ($100 × .10).
393 See text accompanying notes 418-21.
394 See sources cited in note 356.
395 See text accompanying notes 357-84.
the interest rate on the debt means that the lender's income will be overstated due to the lack of indexation and that the lender's overpayment of taxes will compensate for the borrower's underpayment of taxes, keeping the fisc whole.

There are several responses to this argument against debt indexation. First, even if the argument is empirically correct, the appearance of arbitrage may have serious negative consequences for the tax system. While viewing a borrower's excess interest payments as indirect taxes may mean that the borrower's "total" tax liability may be correct, the borrower's direct tax liability is disproportionately low relative to her economic income. The appearance of arbitrage may lead to a general perception that the tax system is unfair which may in turn erode public support for the income tax and lead to widespread noncompliance.

Second, as an empirical matter, both the assumption that the lender is paying a proxy tax and the assumption that interest rates will have risen to account for the proxy tax are questionable. As a result of the clientele effect, lenders tend to be in lower tax brackets than do bor-

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396 Arguing that someone else has paid your taxes for you is a bit like "the story of my great grandfather who used to serve in the Civil War—well, he didn't really serve in the Civil War, he paid someone else to serve in the Civil War." Comments at the Meeting of the Tax Structure and Simplification Comm. of the ABA Tax Sec. (May 15, 1992), 93 TNT 33-135, Feb. 11, 1993, transcript available in LEXIS, Fedtax Library, TNT File (comments by Emil Sunley, attributing remark to David Brockway). Frederic W. Hickman notes that: [I]t seems fair to observe that the appearance problem is in large part generated and perpetuated by people telling each other that it exists, and most ordinary voters would pay little attention if they were not constantly reminded that they are concerned. However that may be—whatever the origins of the lament—the political reality is that there is an appearance problem and that, human nature being what it is, the problem is not going to disappear. Hickman, note 356, at 775 (emphasis in original).

397 An appearance of unfairness in the tax system may decrease overall compliance as taxpayers who feel they are bearing a disproportionate amount of the tax burden take steps to avoid paying taxes. The concern over the effect of the appearance of unfairness on compliance can be seen as one of the major impetuses behind the creation of the 1986 Act's passive loss rules, which significantly limited the use of tax shelters. See S. Rep. No. 313, 99th Cong., 2d Sess. 713 (1986), reprinted in 1986-3 C.B. (vol. 3) 1, 713. Congress justified the enactment of the passive loss rules in order to stop taxpayers from "losing faith in the Federal income tax system," which in turn "undermines compliance." Id. at 713-14.

The committee believes that the most important sources of support for the Federal income tax system are the average citizens who simply report their income (typically consisting predominantly of items such as salaries, wages, pensions, interest, and dividends) and pay tax under the general rules. To the extent that these citizens feel that they are bearing a disproportionate burden with regard to the costs of government ... the tax system itself is threatened.

Id. at 714.
Therefore, in general, the taxes paid by the lender fail to compensate for the taxes avoided by the borrower. Moreover, empirical studies suggest that nominal interest rates have not risen to compensate for the taxation of the inflationary component of nominal interest. Therefore, not only are the wrong amount of taxes being paid, but, both as a matter of appearance and a matter of reality, they are being paid by the wrong party.

One reason that interest rates have not adjusted to compensate for arbitrage is the existence of what has been referred to as pure arbitrage. In a pure arbitrage transaction, the same person acts as both lender and borrower. As a result, both the demand and supply of loanable funds are simultaneously increased and, therefore, there is no market pressure on interest rates to increase. A simple example demonstrates pure arbitrage:

*Example 40:* Kate has an individual retirement account (IRA) worth $100,000 and, in the absence of tax considerations, has invested the entire amount in the stock market. After consulting her tax advisor, Kate undertakes the following transactions: 1) she arranges for her IRA to dispose of its entire stock portfolio; 2) she borrows $100,000 from her IRA; and 3) she invests the $100,000 in loan proceeds in an identical stock portfolio.

Assuming that capital assets are indexed, but debt is not, Kate would have the advantage of both indexing and deferral on her stock portfolio while being able to take full advantage of the failure to index debt. While, it is possible to attack such a transaction with anti-arbitrage rules, such rules often can be avoided. For example, if tax rules prevent Kate from borrowing from her IRA and deducting the interest, she simply can borrow $100,000 from the bank and have the IRA invest in certificates of deposit. If tax rules characterize the interest expense as investment interest and she has inadequate investment income, she can secure the loan with her personal residence and con-

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398 The "clientele effect" refers to the fact that low-bracket taxpayers find it attractive to hold debt while high-bracket taxpayers find it attractive to borrow. See note 378 (discussing estimates of federal tax revenue loss due to the clientele effect).

399 See note 376 (discussing empirical studies that indicate nominal rates tend to rise at most one for one with inflation).

400 See Steuerle, Taxes, note 382, at 57-80 (comparing "normal" and "pure" arbitrage). See also note 377 (discussing other theories as to why interest rates have not adjusted).

401 See Auerbach, Interest Deductions, note 383, at 204 (arguing that pure arbitrage exists "whenever it is possible to alter the amount of income excluded from the aggregate tax base without altering the underlying supply of real assets").

402 The example is similar to one provided by Steuerle, Taxes, note 382, at 71.
vert the interest into deductible home mortgage interest. If she has already used up her home mortgage interest, she can arrange for the debt to be traced to current business expenses, thereby converting the interest into fully deductible business interest. When all is said and done, the opportunities for arbitrage transactions outstrip the ability and the willingness of Congress and the tax collector to stop the arbitrage.

Even admitting, however, that partial indexing would present arbitrage opportunities, defenders of partial indexing are able to point out that similar arbitrage opportunities are presented by a capital gains exclusion or preferential rate. Thus, while arbitrage is a real problem, they argue it is a problem with which the tax system is both familiar and comfortable.

Example 41: Assume in Example 39 that instead of indexing, Margot was permitted a 30% exclusion for capital gains. In that case, Margot's taxable income from the sale of the asset would be $14 When combined with her interest deduction of $15, she would have a net loss of $1, despite having economic income of $5.

The fact is, however, that while the tax system is familiar with the problem of arbitrage, it is not comfortable. Congress in the past has enacted a plethora of anti-arbitrage rules, and shows every sign of continuing to do so in the future. Such anti-arbitrage rules add significantly to the complexity and administrative cost of the tax system.

As an example of the type of new anti-arbitrage provisions that would be necessitated by partial indexation, the indexing proposal

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403 IRC § 163(h)(2)(D), (h)(3).

404 Assuming that the debt was secured by the residence, but was not used to acquire the residence, the debt would be characterized as home equity indebtedness and would be limited to $100,000. IRC § 163(h)(3)(C)(ii). If she had planned ahead, she could have traced the proceeds of the debt to the acquisition of the residence. In that case, the debt would be limited to a total of $1,100,000. IRC § 163(h)(3)(B)(ii) (acquisition indebtedness limited to $1 million); IRC § 163(h)(3)(C) (permitting an additional $100,000 to be characterized as home equity indebtedness).

405 IRC § 163(h)(2)(A); Temp. Reg. § 1.163-ST.

406 Although not defenders of partial indexation, Halperin and Steuerle correctly point out that "[t]he question should not be whether partial indexing provides opportunities for arbitrage, but whether it increases or reduces the arbitrage opportunities that would otherwise exist." Halperin & Steuerle, note 103, at 360.

407 $14 = 20 \times (1 - .30).

408 Most recently, Congress added § 1258, an attempt to limit the preferential treatment of capital gains by recharacterizing certain capital gains as ordinary income. A sampling of other arbitrage provisions include § 163(d) (investment interest limitations), § 263(g) (capitalization of certain carrying charges), § 263A (uniform capitalization rules), § 469 (passive loss rules) and § 1092 (straddle rules).
passed by the House in 1992 would have amended the investment interest limitation to exclude all gain from the sale of indexed assets from the definition of investment interest.409 The proposal demonstrates how difficult it is to craft an appropriate anti-arbitrage rule. The limitation on investment interest in the proposal is both under- and over-inclusive.410 The limitation is under-inclusive because it only limits investment interest, but not trade or business interest (or, for that matter, home mortgage interest). The problem of debt arbitrage is equally present in the business as well as in the investment context.411 In addition, it is under-inclusive because, to the extent that a taxpayer has sufficient investment income from sources other than indexed gain to offset investment interest expense, the investment interest limitation has no effect in limiting the taxpayer’s ability to arbitrage by financing indexed capital gain with unindexed debt. In effect, the investment interest limitation permits taxpayers to use debt arbitrage to avoid tax on their investment income entirely, but does not permit the use of debt arbitrage to avoid taxes on business income.

An investment interest limitation such as the one contained in the bill is over-inclusive because it does not permit the deduction of interest expense incurred to finance an investment that turns out to yield a

409 H.R. 4210, note 73, at § 2102(b). The bill also would have permitted taxpayers to elect to include gains on the sale of indexable assets for purposes of § 163(d) if they agreed to forgo the benefit of indexing. Id. The election would have been permitted on an asset-by-asset basis. Id.

Similarly, when Congress raised the top individual statutory marginal rate from 31% to 39.6% while maintaining a 28% top statutory marginal rate on capital gains, it permitted taxpayers to elect either to exclude the entire amount of a capital gain from the computation of investment income or to include the entire gain, but forgo the benefit of the reduced rate. IRC § 1(a)-(e) (providing for a top rate on ordinary income of 39.6%); § 1(h) (reducing the net capital gain by any amount included as investment income under § 163(d)(4)(B)(iii)); and § 163(d)(4)(B)(iii) (permitting taxpayers to elect to include net capital gain in the computation of net investment income).

Interestingly, when the House passed a similar indexing provision in 1989, it included a capital gains deduction for the period prior to the beginning of indexing. H.R. 3299, note 73, at § 11951(a). In order to limit the debt arbitrage problems caused by the capital gains deduction, the bill provided that the amount of the deduction would reduce the amount of investment income for purposes of § 163(d). Id. In other words, in the context of the capital gains deduction, the bill permitted the net capital gain taken into income to be offset by interest deductions. With respect to indexing, however, no gain from an indexed asset can be offset by an interest deduction. Id. at § 11961(b). The difference between these two rules is puzzling.

410 See Shuldiner, General Approach, note 79, at 273-75 (discussing problems with § 163(d)).

411 Note also that § 163(d) does not apply to corporations. This was not a problem in the 1992 House Bill because the bill did not extend indexing to corporations. H.R. 4210, note 73, at § 2101(a). If, however, indexing is extended to corporations, further rules would be necessary. As a general matter, it is hard to understand why indexing should be permitted for individuals, but not corporations.
bona fide capital loss, thus resulting in a clear overmeasurement of income. Additionally, by excluding the entire gain on indexed assets from the definition of investment interest, the rule would tend to overstate investors’ real income.412

Unfortunately, a comprehensive solution to the problems of the investment interest limitation would require rules linking debt to specific investments413 and, ultimately, rules to determine the amount of inflation-induced overstatement of interest expense. Rather than developing and administering such rules, it would be simpler to index liabilities in the first place.414

A final problem with partial indexing is that it puts further pressure on identifying debt. Already, the identification of an interest in a corporation as debt versus equity is one of the most perplexing problems in the tax law.415 In a world where new financial products are created at the touch of a button, the problem only becomes worse.416

In summary, partial indexing promises to be a cure worse than the disease.417

412 Thus, for example, in Example 39, if such a rule were imposed, the taxpayer would have indexed income of $10, but would not be permitted any interest deduction. Therefore, her taxable income would be $10, while her economic income is only $5.

413 Compare the passive loss rules which permit a loss upon final disposition of an investment. IRC § 469(g).

414 There is another significant disadvantage to excluding debt from indexation. In a comprehensive indexing system, interests in entities generally can be indexed at the interest holder’s level without regard to the composition of the assets and liabilities of the entity. If debt is excluded, however, indexing cannot be done without information from the entity as to its mix of assets and liabilities. Where the entity holds debt instruments, indexing at the individual level without regard to the asset mix would overstate the indexing adjustment, leading taxpayers to hold debt instruments in such entities. Where the entity has liabilities, indexing at the individual level without regard to the existence of the liability would understated the indexing deduction, leading taxpayers to borrow at the individual level.

415 See note 384 (discussing the difficulty of distinguishing debt versus equity).


417 See text accompanying notes 59-73 (suggesting that given deferral, the failure to index capital gains is not serious).
B. Global Indexation

A potential alternative to both conventional full indexation and partial indexation is global indexation. In general, under conventional full indexation, a taxpayer’s total indexation adjustment is the sum of the individual indexation adjustments for each asset and liability of the taxpayer. Putting aside questions of timing, a taxpayer’s total indexation adjustment could be determined by netting the taxpayer’s assets and liabilities each year (using basis, not fair market value) and applying a single indexation factor. This equivalence suggests the use of global indexation, rather than asset by asset indexation. Under global indexation, a taxpayer would report the combined basis in all of its assets and the combined “basis” of its liabilities. The taxpayer would then net its assets and liabilities and apply a single indexation factor for the year. The resulting indexation adjustment simply would be added to or subtracted from its taxable income for the year.

In the case of corporations and other business taxpayers, global indexation would be based on numbers that are already readily available and has the advantage of extreme simplicity. A disadvantage of global indexation is that the indexation adjustment would automatically be made currently for all assets, despite the fact that the income from some of the assets would be deferred. In addition, there are some assets, such as tax-exempt bonds, for which indexing adjustments should be unavailable. It would be necessary, therefore, to exclude the taxpayer’s basis in such assets in the global computation. Nevertheless, the potential administrative advantages of global indexing are enormous and should be pursued.

For individuals, global indexing makes less sense. To begin with, individuals generally do not keep careful track of the basis in all of their assets and liabilities. More importantly, indexing is inappropriate for a higher percentage of the assets and liabilities of individuals. Generally, if the income from an asset or the expense from a liability is not subject to tax, no indexing adjustment should be made with respect to that asset or liability. Thus, for example, no adjustment should be made with respect to indebtedness used for personal purposes because the interest on such debt is not deductible. Similarly, no adjustment should be made with respect to assets used for personal purposes because individuals generally are not taxed on the income from such assets. Even where gain is potentially taxable on assets

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418 See text accompanying note 102 (discussing timing of indexation adjustments).
419 Similar issues would be raised, for example, where a U.S. corporation owned a foreign corporation, the income from which was deferred. Cf. IRC §§ 951-964 (subpart F) (requiring current inclusion of certain amounts earned by controlled foreign corporations).
420 IRC § 163(h)(1) (personal interest).
used for personal purposes, such as residences, the taxation is uncertain and generally significantly deferred.\footnote{IRC § 1034 (rollover of gain on sale of principal residence); IRC § 121 (one-time exclusion of gain from the sale of a principal residence by an individual aged 55 or older); IRC § 1014 (step-up in basis at death).} It is likely that the number of corrections and special rules that would be required to make global indexing work for individuals outweighs the potential simplification of the approach. In addition, global indexing would be more difficult than asset by asset indexing to enforce through third party reporting.

**XI. Conclusion**

In Section II, I showed how, even at moderate rates, the effect of inflation in an unindexed tax system is to impose very high effective tax rates on income from capital, an unattractive feature in an income tax. Even for those who believe that the statutory tax rates on income from capital are too low, it is hard to argue in favor of a system where the tax rate is determined not by statute, but by the level of inflation. From an equity standpoint, the failure to index is at best peculiar. From an efficiency standpoint, such high rates of tax presumably lead to an inefficient amount of savings and to a more severe lock-in effect than otherwise would be the case. Moreover, the fact that inflation affects short-lived assets more severely than long-lived assets distorts decisionmaking in favor of longer-lived assets.

On the other hand, as discussed in Section II, because of deferral (and the ability to accelerate losses relative to gains), the effective tax rate on assets with long holding periods may be quite low. While it would seem to be an unambiguous good to both index and solve the problem of deferral, without limiting the ability of taxpayers to defer gains the desirability of indexing becomes less clear. On the other hand, for short-lived assets, relief is clearly appropriate. Moreover, as Congress forces more transactions to be accounted for on a mark-to-market basis, the scope of the inflation problem expands.

On balance and in theory, indexation of capital assets is probably a good idea. In practice, the decision is less clear. At least initially, indexation would impose a tremendous administrative cost on the system. In Section IV, I have tried to give some feel for the details of indexation. I have, however, only touched the surface of the administrative details of indexation. In particular, I have not discussed the
treatment of pass-through entities which would significantly complicate indexation.\footnote{\textsuperscript{422} See N.Y. St. Bar Ass’n, Tax Sec., NYSBA Tax Section Opposes Indexing of Capital Assets, 90 TNT 138-8, July 2, 1990, available in LEXIS, Fedtax Library, TNT File, for a discussion of some of the issues raised by pass-through entities.}

The other major uncertainty about indexing is whether debt would be included in any indexing scheme. In many ways, the arguments in favor of indexing debt are stronger than the arguments in favor of indexing other capital assets. First, consider debt as an asset. Debt is one of the few assets that is generally taxed on a current basis. As a result, the effect of inflation on debt is particularly pernicious. Second, consider debt as a liability. As discussed in Section X, the failure to index debt greatly facilitates the use of debt for tax arbitrage purposes. Indexation would significantly temper the attractiveness of arbitrage transactions. By doing so, it would relieve pressure on the myriad of rules that have been established to prevent arbitrage. Thus, to some extent, the administrative burden of debt indexation would be tempered by the reduced administrative burden of enforcing arbitrage restrictions.

One problem with debt indexation is the deductibility of home mortgage interest. There are basically three approaches to home mortgage interest. First, it could be unindexed for both borrower and lender. Second, it could be indexed for lenders, but not borrowers. Third, it could be fully indexed. Of the three alternatives, the last is clearly the best. It represents perhaps the best opportunity to treat home ownership in a more rational fashion. The second is the second-best solution. It limits the damage to the homeowner and makes the revenue cost of the tax expenditure clear. The least attractive alternative is to create a class of unindexed debt in a world of indexation. The primary justification for the first approach over the second approach is revenue, but the revenue would be illusory because the vast majority of mortgage debt would end up in the hands of tax-exempt entities.

Despite the fact that the theoretical case for indexing debt is at least as strong as the case for indexing capital gains, it is not unlikely that indexing would be adopted for assets, but not for liabilities. As discussed in Section X, indexing assets without liabilities would significantly expand the arbitrage opportunities that are already available. While the tax law has evolved to deal with arbitrage in the past, indexing assets without debt would expand the pressure on the anti-arbitrage provisions. Over time, adequate responses likely would develop, but at the cost of further distortion and complexity. Overall, I believe that it would be a mistake to index capital assets without...
indexing debt at the same time. On the other hand, I believe that indexing debt is sufficiently attractive that serious thought should be given to indexing debt, even if assets are not indexed at the same time.
DETERMINING THE EFFECTIVE TAX RATE ON CAPITAL GAINS

Table 2 shows the effective tax rate on capital gains with and without indexing as a function of holding period. Without indexing, the effective rate is shown both as a nominal and a real figure. The computations shown in Table 2 assume that the entire yield on the asset is realized at maturity. The effective tax rates also can be expressed as equations. The equations are provided below.

Defining the following variables:

\[ n \] = number of periods before asset is sold
\[ \tau \] = statutory tax rate
\[ r \] = real rate of return
\[ \pi \] = inflation rate
\[ z \] = nominal growth rate
\[ \tau_{en} \] = nominal effective tax rate without indexing
\[ \tau_{er} \] = real effective tax rate without indexing
\[ \tau_{ei} \] = nominal effective tax rate with indexing

The nominal growth rate can be expressed as:

\[ z = \pi + r + (r \times \pi) \]  

The nominal effective tax rate without indexing is:

\[ \tau_{en} = \frac{(1 + z) - [(1 - \tau) \times (1 + z)^n + \tau]^\frac{1}{n}}{z} \]  

The real effective tax rate without indexing is:

\[ \tau_{er} = \frac{(1 + z) - [(1 - \tau) \times (1 + z)^n + \tau]^\frac{1}{n}}{(z - \pi)} \]  

The real effective tax rate with indexing is:

\[ \tau_{ei} = \frac{(1 + r) - [(1 - \tau) \times (1 + r)^n + \tau]^\frac{1}{n}}{r} \]
APPENDIX II
INDEXING AND THE LOCK-IN EFFECT

I. INDEXATION AVAILABLE FOR EXISTING AS WELL AS NEW ASSETS

In the body of the Article, I assert that with indexation, there remains a positive lock-in effect for appreciated assets. In other words, assuming that indexing is available for both existing and newly purchased assets, a taxpayer holding an appreciated asset would have an incentive to continue to defer the recognition of gain on the asset, despite the fact that, by recognizing gain on the asset, the taxpayer would receive a stepped-up basis that would, in turn, lead to a greater indexation adjustment in the future. To prove this proposition, define $FV_h$ as the future value of an asset, given that it is held to maturity. $FV_h$ can be expressed as follows:

$$FV_h = (1 + \pi)^n \times [FMV \times (1 + r)^n - \tau \times [FMV \times (1 + r)^n - B]]$$

(14)

where,

$$FMV = \text{the current fair market value of the asset;}$$

$$r = \text{the real rate of return;}$$

$$\pi = \text{the rate of inflation;}$$

$$n = \text{the number of years from the present until final disposition; and}$$

$$B = \text{the taxpayer's basis in the asset.}$$

Similarly, define $FV_s$ as the future value of the asset, given that the taxpayer sells and repurchases the asset. $FV_s$ is derived most easily by first defining $FMV_{at}$, the after-tax proceeds from a current sale of the asset. $FMV_{at}$ can be expressed as follows:

$$FMV_{at} = FMV - \tau \times (FMV - B)$$

(15)

$FV_s$ can now be derived by first substituting the term $FMV_{at}$ for both $FMV$ and $B$ in the expression for $FV_h$ given by Equation (14):

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423 See generally Section III.B.3 (discussing indexation and the lock-in effect).
424 See Section II for a discussion of the effect of permitting indexation only on newly purchased assets.
425 $B$ could be either the taxpayer’s cost basis or the taxpayer’s cost basis indexed for prior inflation. In either case, as long as there is real gain, there would be a positive lock-in effect as shown below.
426 The lock-in effect can be viewed as a question of whether a taxpayer would hold onto an existing asset rather than sell the asset and purchase an asset with a slightly higher rate of return. For simplicity, the discussion in the text assumes that the taxpayer simply repurchases the same asset.
Substituting the expression for \( FMV_{\text{ar}} \) from Equation (15) into Equation (16) and rearranging terms, one obtains:

\[
FV_s = (1 + \pi)^n \times [(1 + r)^n - \tau \times [(1 + r)^n - 1]] \times (FMV - \tau \times (FMV - B))
\] (17)

Given the expressions for \( FV_h \) and \( FV_s \), it is possible to define \( \delta \) to be the difference between the future value of the asset under the hold and sell strategies. \( \delta \) can thus be expressed as:

\[
\delta = FV_h - FV_s
\] (18)

Substituting the expressions for \( FV_h \) and \( FV_s \) from Equations (14) and (17), respectively, into Equation (18) and simplifying, one obtains the following expression for \( \delta \):

\[
\delta = (1 + \pi)^n \times \tau \times (1 - \tau) \times ((1 + r)^n - 1) \times (FMV - B)
\] (19)

Alternatively, the term Gain can be defined as the difference between the fair market value and the basis of the asset and \( \delta \) can be defined as follows:

\[
\delta = (1 + \pi)^n \times \tau \times (1 - \tau) \times ((1 + r)^n - 1) \times \text{Gain}
\] (20)

Equation (20) is the same as Equation (1).\(^{427}\) As noted in the text following Equation (1), as long as both Gain and \( r \) are positive and the tax rate, \( \tau \), is between zero and one, \( \delta \) will always be greater than zero and, therefore, there will be a positive lock-in effect.

The lock-in effect shown by Equation (20) is expressed in terms of current dollars. The lock-in effect can also be expressed in terms of constant dollars.

\[
\delta_{\text{const}} = \frac{\delta}{(1 + \pi)^n}
\] (21)

Substituting \( \delta \) from Equation (20) into Equation (21):\(^{428}\)

\[
\delta_{\text{const}} = \tau \times (1 - \tau) \times ((1 + r)^n - 1) \times \text{Gain}
\] (22)

\(^{427}\) See text accompanying note 85.

\(^{428}\) \( \delta_{\text{const}} \) is defined in terms of dollars at the time the decision to sell or hold is made. Note that Equation (22) is the same as Equation (2). See text following note 89.
As can be seen from Equation (22), $\delta_{\text{const}}$ is independent of the inflation rate, $\pi$. Thus, in real terms, with indexation, the lock-in effect is independent of the inflation rate.

In the body of the Article, I also assert that the magnitude of the lock-in effect, $\delta$, increases with the real growth rate, $r$.\footnote{429 See text at note 89.} That $\delta$ is an increasing function of $r$ can be shown by differentiating Equation (20) with respect to $r$:

$$\frac{d\delta}{dr} = (1 + \pi)^n \times \tau \times (1 - \tau) \times (1 + r)^{n-1} \times n \times \text{Gain}$$  \hspace{1cm} (23)

Since the derivative $d\delta/dr$ is always positive, $\delta$ is an increasing function of $r$.

II. INDEXING AVAILABLE FOR NEW ASSETS ONLY

In the preceding Section, I show that the lock-in effect remains when indexation is available for both new and existing assets. By contrast, if indexing is available for new assets only, the lock-in effect may disappear or become a lock-out or negative lock-in effect. Using the subscript "n" to denote that indexing is only available for new assets, define $\delta_n$ as the difference between the future value of the asset if it is held, $FV_{hn}$, minus the future value if it is sold and repurchased, $FV_{sn}$, given that indexation is available for new assets only.

$$\delta_n = FV_{hn} - FV_{sn}$$  \hspace{1cm} (24)

Since indexing is available for new assets, $FV_{sn}$ is the same as $FV_i$ given by Equation (17).

$$FV_{sn} = (1 + \pi)^n \times [(1 + r)^n - \tau \times [(1 + r)^n - 1]]$$

$$= (FMV - \tau \times (FMV - B))$$  \hspace{1cm} (25)

Indexing, however, is now unavailable for existing assets and, therefore, $FV_{hn}$ becomes:

$$FV_{hn} = (1 - \tau) \times FMV \times (1 + r)^n \times (1 + \pi)^n + (\tau \times B)$$  \hspace{1cm} (26)

Substituting the expressions for $FV_{sn}$ and $FV_{hn}$ from Equations (25) and (26), respectively, into Equation (24) and simplifying, $\delta_n$ becomes:

$$\delta_n = (1 + \pi)^n \times \tau \times (1 - \tau) \times [(1 + r)^n - 1] \times FMV - \tau \times [(1 + \pi)^n \times [(1 - \tau) \times (1 + r)^n + \tau] - 1] \times B$$  \hspace{1cm} (27)
\( \delta_n \) can be either positive, indicating a positive lock-in effect, or negative, indicating a negative lock-in effect, depending on the relative size of the parameters. In general, if the amount of gain is small, there would be a negative lock-in effect because the benefit of future indexation would outweigh the burden of the current tax. In the extreme case where there is no current gain, there is no cost to selling the asset and a clear benefit from future indexation. In equation form, when the basis, \( B \), is equal to the fair market value, \( FMV \), Equation (27) reduces to:

\[
\delta_n = \tau \times FMV \times (1 - (1 + \pi)^n)
\]

As long as the rate of inflation, \( \pi \), is greater than zero, \( \delta_n \) in Equation (28) will always be less than zero and there will be a negative lock-in effect.

Correspondingly, at the opposite extreme where the taxpayer’s basis is zero, it is irrelevant that there is no indexation of existing assets and, therefore, there is a positive lock-in effect. In equation form, when the basis is equal to zero, Equation (27) reduces to:

\[
\delta_n = (1 + \pi)^n \times \tau \times (1 - \tau) \times ((1 + r)^n - 1) \times FMV
\]

The expression for \( \delta_n \) in Equation (29) is the same as the expression for \( \delta \) in Equation (19) where \( B \) is also set to zero. Since \( \delta \) is always greater than zero, so is \( \delta_n \).

The implications of Equation (27) also can be seen using a numerical example. Assume that the fair market value of the asset, \( FMV \), is \$1,000, the real growth rate, \( r \), and the inflation rate, \( \pi \), are both 5% per year, the asset is to be held an additional five years, and the tax rate, \( \tau \), is 50%. Given these assumptions, it is easy to see the impact of a relatively low or high basis on the lock-in effect. Consider first a high-basis case. If \( B \) is equal to \$900, a high-basis case, \( \delta_n \) is equal to \(-116\) and there is a negative lock-in effect. If, on the other hand, \( B \), is only \$100, \( \delta_n \) is equal to 66, and there is a positive lock-in effect.

The breakeven point, where there is no incentive to either sell or hold the asset, can be determined by setting \( \delta_n \) in Equation (27) equal to zero and rearranging terms:

\[
B = \frac{(1 - \tau) \times (N - I)}{(1 - \tau) \times (N - I) + (I - 1)} \times FMV
\]

where:

\[
N = (1 + \pi)^n \times (1 + r)^n
\]
and:

\[ I = (1 + \pi)^n \]  

(32)

In Equation (30), \( N \) represents the total nominal growth in the price of the asset and \( I \) represents the pure inflationary growth in the asset price.\(^{430} \) In the above example, the breakeven point is when the taxpayer has a basis of \$390. Thus, in the example, if indexation is available to new assets, but not old assets, the taxpayer would have an incentive to sell the existing asset so as to receive an indexable basis if her basis was in excess of \$390 and would have an incentive to hold onto the asset so as to continue to defer her gain if her basis was less than \$390.

When the inflation rate, \( \pi \), is equal to zero, the right hand side of Equation (30) is equal to one, implying that the breakeven point between lock-in and lock-out is where the basis, \( B \), is equal to the fair market value of the asset, \( FMV \). Thus, without inflation, indexation is irrelevant and the conventional result holds: There is lock-in if the asset has appreciated and lock-out if the asset has depreciated.

III. INDEXING NOT AVAILABLE FOR EITHER NEW OR EXISTING ASSETS

In this Section, I prove two propositions in the absence of indexation. First, I show that there is always a positive lock-in effect with appreciated assets. Second, I show that in real terms the lock-in effect increases with inflation. Using the subscript "ni" to denote that no indexation is permitted, define \( \delta_{ni} \) as the difference between the future value of the asset under the hold and lock-out strategies where indexation is unavailable. The formula for \( \delta_{ni} \) can easily be derived by starting with the formula for \( \delta \), the difference between the future hold and sell values if indexation is permitted for both new and existing assets. As shown in Equation (19), with indexation \( \delta \) can be expressed as follows:

\[ \delta = (1 + \pi)^n \times \tau \times (1 - \tau) \times ((1 + r)^n - 1) \times (FMV - B) \]  

(33)

To derive \( \delta_{ni} \) from \( \delta \), consider what it means to be taxed without indexation. Without indexation, the tax law does not distinguish between real growth and inflationary changes in price. In other words, the tax law treats a taxpayer as if there were no inflation and there were real growth at the nominal growth rate. Thus, \( \delta \) can be derived from \( \delta_{ni} \) by substituting zero for the inflation rate, \( \pi \), and substituting the nominal growth rate, \( g \) for the real growth rate, \( r \):

\(^{430} N \) is equal to one plus the nominal growth rate and \( I \) is equal to one plus the inflationary growth rate.
\[ \delta_n = \tau \times (1 - \tau) \times ((1 + g)^n - 1) \times (FMV - B) \]  

(34)

where:

\[ g = r + \pi + r \times \pi \]  

(35)

Substituting the expression for \( g \) from Equation (35) into Equation (34), one obtains:

\[ \delta_n = \tau \times (1 - \tau) \times ((1 + r + \pi + r \times \pi)^n - 1) \times (FMV - B) \]  

(36)

By inspection, it is clear that so long as the asset has appreciated (that is, \( FMV \) is greater than \( B \)), the tax rate is between zero and one, and the nominal growth rate is positive, \( \delta_n \) will be greater than zero and there will be a positive lock-in effect.

To show that in real terms the lock-in effect increases with the rate of inflation, first define \( \delta_{ni-const} \) as the difference between the future values of the asset under the hold and sell strategies stated in constant dollars: \(^{431}\)

\[ \delta_{ni-const} = \frac{\delta_n}{(1 + \pi)^n} \]  

(37)

Substituting the expression for \( \delta_n \) from Equation (36) into Equation (37):

\[ \delta_{ni-const} = \frac{\tau \times (1 - \tau) \times ((1 + r + \pi + r \times \pi)^n - 1) \times (FMV - B)}{(1 + \pi)^n} \]  

(38)

Taking the derivative of \( \delta_{ni-const} \) with respect to the inflation rate \( \pi \) one obtains:

\[ \frac{d\delta_{ni-const}}{d\pi} = \frac{n \times \tau \times (1 - \tau) \times (FMV - B)}{(1 + \pi)^{n+1}} \]  

(39)

As long as the asset is appreciated, the tax rate is between zero and one, and there is positive inflation, the derivative is greater than zero and, therefore, the lock-in effect increases with the inflation rate.

\(^{431}\) \( \delta_{ni-const} \) is defined in terms of dollars at the time the decision to sell or hold is made.