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THE TAXATION OF INCOME FROM CAPITAL IN THE UNITED STATES, 1980-1986

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ABSTRACT

Tax rules have changed almost yearly in the United States since 1980. In particular, the Economic Recovery Tax Act of 1981 reduced marginal tax rates and shortened depreciation lifetimes, while the Tax Reform Act of 1986 reduced marginal tax rates, repealed the investment tax credit, and lengthened depreciation lifetimes.

This paper estimates marginal effective tax rates on income from capital under each year's tax law, using the methodology of King and Fullerton (1984) to maintain comparability with earlier calculations for the U.S. and current calculations for other countries. The 1981 law substantially reduced effective tax rates, while subsequent changes raised them back again. A primary effect of the 1986 law was to make diverse effective tax rates more uniform.

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THE TAXATION OF INCOME FROM CAPITAL IN THE UNITED STATES, 1980-1986

I. Introduction

The revenue from capital income taxation as a fraction of total government revenue has been declining in the past thirty years. Nevertheless, the academic literature has been paying increasing attention to the subject of capital income taxation, primarily because of the effects on investment incentives. In a perfectly competitive world with no uncertainty, and in the absence of any taxes, equilibrium would require that investment projects at the margin would receive just the interest rate paid to savers at the margin. In general, however, the government uses the tax system both to generate revenue and to stimulate investment and productivity. As a consequence, the returns to savers and investors diverge, and the incentives facing them are obscured.

A careful investigation of these incentive effects should account for corporate and personal taxes as well as for the interaction of the two. This interaction is essential because, for example, interest payments are deductible at the corporate level but are taxed in the hands of the personal sector upon receipt. Therefore, the effective tax rate becomes a combined function of personal and corporate taxes. Moreover, the relationship between investment and taxation depends on corporate financial policy and on the pattern of ownership of corporate securities. There is no unique cost

of capital to the corporate sector that is independent of ownership pattern or of capital structure.

One study of the incentive effects of capital income taxes is the book edited by King and Fullerton (1984, hereafter KF). They estimated marginal effective tax rates in four countries with a common theoretical framework. Using 1980 as a reference year, their interest focused on the international comparisons offered by the different tax regimes. In this paper, we concentrate on a slightly different issue. We apply the KF methodology to the U.S. economy only, for the years 1980 through 1986. This time series approach provides an illustration of the evolution of the tax treatment of income from capital in our decade. In order to maintain strict comparability of results with those of KF for 1980, and with those of other researchers who apply the KF methodology to additional countries in more recent years, we resist the urge to tinker with the model. We use exactly the same computer programs that were used for the KF study. We collect tax data and parameters for more recent years, but our results for 1980 exactly match those in the book. We use the same set of 81 hypothetical projects, the same weights, and the same assumptions about arbitrage and inflation. We therefore concentrate on tax changes only.

The underlying model follows along the lines of Hall and Jorgenson (1967) in finding the user cost of capital for each project. The net private rate of return depends both on the source of finance used and the category of ownership of the returns. The proportional difference between the average of the pretax rate of return and the average of the posttax rate of return weighted over all the hypothetical projects constitutes the overall marginal effective total tax rate (METTR). An alternative approach would be to measure effective tax rates by taking the ratio of observed

taxes to income from existing investments. Although these "average" effective tax rates would reflect adequately the cashflows and tax burdens, the METTRs are intended to capture the incentives to save and invest.[1] We acknowledge the difficulties in using METTRs, as discussed for example in Summmers (1987) or Bradford and Fullerton (1981), but we choose not to review these complex issues in this paper. Instead, we proceed with a previously discussed methodology from King and Fullerton (1984) to estimate effective tax rates for 1980 through the Tax Reform Act of 1986. For each year, we provide effective tax rates for the fully phased-in version of the law as enacted.

We find that the overall marginal effective total tax rate fell from 37 percent in 1980 to 23 percent under post-transition 1981 law, and remained low until 1986 when the fully phased-in tax rate increased to 42 percent. Furthermore, it showed a moderate tendency to rise with inflation. We also find that the individual rates were distributed more uniformly in 1986 than in any other year. The biggest difference in effective tax rates, that between debt financed projects and equity financed projects, was substantially reduced by the Tax Reform Act of 1986.

The rest of the paper is organized as follows. Section II describes the underlying model. Section III provides detail on the parameters, the tax provisions, and the data used. Section IV analyzes our findings, and section V concludes.

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[1]Many other differences between average and marginal effective tax rates are discussed in Fullerton (1984).

II. The Methodological Framework

The notation and methodology in this section follows King (1977) and King and Fullerton (1984). Consider an economic environment in which there is perfect competition, perfect mobility, and no uncertainty. A firm contemplating a new investment project will, in equilibrium, equate the net outlay to the present value of net returns. If the cost of the project is one dollar, and the present discounted value of any grants or tax allowances on the unit of investment is A, then the net outlay is

$$C = 1 - A \quad . \tag{1}$$

Assume that this dollar invested will generate returns whose nominal value increases with inflation and decreases with the rate of depreciation. These returns are then discounted at the firm's discount rate. Then the present discounted value of the profit stream net of taxes is given by

$$V = \frac{(1-\tau)MRR - d\tau v\pi - (1-\tau)w_c}{\rho + \delta - \pi} \quad , \tag{2}$$

where τ is the corporate tax rate, MRR the marginal rate of return, v the proportion of inventories on original cost accounting (FIFO as opposed to LIFO), w_c the corporate wealth rate, π the inflation rate, ρ the discount rate and δ the exponential rate of economic depreciation. The dummy variable d takes the value 1 (one) for inventories and 0 (zero) for everything else.

Now, if the rate of return net of depreciation is

$$p = MRR - \delta \quad , \tag{3}$$

and we set the net outlay C equal to the present value of net returns V, then we can solve (1), (2) and (3) to get

$$p = \frac{[(1 - A)(\rho + \delta - \pi) + d\tau v\pi]}{(1 - \tau)} + w_c - \delta \quad . \tag{4}$$

To derive an expression for A, we assume that grants and allowances for investment take one of three forms: (1) standard depreciation allowances; (2) immediate expensing or free depreciation; and (3) cash grants. The proportion of the cost of an asset that is entitled to standard depreciation allowances is denoted by f_1, and the present value of tax savings from standard depreciation allowances on a unit of investment is A_d. Note, also, that A_d is the product of the statutory corporate rate, τ, times the present value of allowances, A_z. If f_2 denotes the proportion of the cost of the project qualifying for immediate expensing at the corporate rate, then the tax savings from this write-off is $f_2\tau$. Finally, suppose that the proportion qualifying for grants is denoted by f_3 and the rate of grant (equivalent to a tax credit) is g. Then,

$$A = f_1A_d + f_2\tau + f_3g \quad . \tag{5}$$

There is no need to restrict the sum of f_1, f_2, and f_3 to unity since at certain times it can exceed one. For example, an investment tax credit may or may not reduce the basis for capital consumption allowances.

Suppose r is the real interest rate and $i = r+\pi$ is the nominal interest rate. The relation between the nominal market interest rate and the return to the saver depends on the tax treatment of personal income. Since the tax law defines the tax base to include the receipt of nominal interest income, the posttax rate of return to the saver is given by

$$s = (1 - m)(r + \pi) - \pi - w_p \quad , \tag{6}$$

where m is the marginal personal tax rate on interest income, and w_p is the personal wealth rate. Then the marginal effective total tax rate can be expressed as $(p-s)/p$, the tax wedge as a fraction of the pretax returns.

To complete the model, we have to link the firm's discount rate to the market interest rate. This relationship will, in general, depend on the source of finance. In the case of debt finance, where nominal interest income is taxed but nominal interest payments are tax deductible,

$$\rho = i(1 - \tau) \quad . \tag{7}$$

For new share issues, a potential investor would require a net rate of return equal to $i(1 - m)$ which reflects his opportunity cost. Then the project should yield a return ρ such that the net of tax dividend yield equals the individual's opportunity cost, $\rho(1 - m) = i(1 - m)$. Hence, for new share issues

$$\rho = i \quad . \tag{8}$$

Finally, for retained earnings, if z is the effective tax rate on accrued capital gains, the project should yield a return ρ such that $\rho(1 - z) = i(1 - m)$. Thus

$$\rho = i \frac{(1 - m)}{(1 - z)} \quad . \tag{9}$$

In this case the cost of capital depends on the personal tax rates which in general differ for stockholders according to their tax brackets. Therefore, the firm would have to equalize the net return to all these investors. However, we can hypothesize a single representative investor or a "Miller equilibrium", where the high tax investors hold equity and the low tax ones hold debt only.[2] Since neither assumption conforms with reality, we calculate the cost of capital for retained earnings using the weighted averages of the parameters in equation (9), where the weights are the shareownership proportions of the different investors.

Having summarized the model, we can now examine two alternative assumptions about arbitrage that are employed in this paper. First, the fixed-p case makes no assumption about arbitrage. We assume that all hypothetical projects yield the same pretax rate of return, and we compute the posttax return to savers for each project. In general, these posttax returns differ across projects. This approach emphasizes the differences in the tax treatment of different investments, and it provides a clear picture of the incentives offered by the tax system. Naturally, we would expect funds to flow from the low yield (high tax) assets towards the high yield (low tax) ones. This reallocation of capital among the various projects would continue until an equilibrium is established in which there exist no

[2]See Miller (1977), and Auerbach and King (1983).

further opportunities for mutually profitable transactions. In a second set of assumptions, called the fixed-r case, we therefore assume that the real rates of return on all projects are equalized for all investors before personal taxes. Differences in personal tax rates will still generate different net rates of return across investors. It must be stressed that when arbitrage eliminates differences among projects in the real rate of interest, there must be differences in the pretax rates of return on different investments. Hence, the tax system distorts the allocation of resources.

The choice between the fixed-p and the fixed-r distributions of marginal effective tax rates depends upon whether we are interested in the tax schedule facing potential investors or in the proportion of marginal factor income that is taxed away. The fixed-p calculations are a better guide to the schedule of tax rates levied on different combinations, but it is the fixed-r distribution of marginal tax rates that would determine the welfare losses resulting from the distortionary nature of the taxation of capital income. Also, the weighted averages in the fixed-r case are a better guide to the ratio of additional taxes paid to additional profits earned as a result of a small increase in the corporate sector capital stock. Although we present selected results for both assumptions, we focus mainly on the fixed-p case. This emphasis corresponds to that in KF, where the primary interest is in the effects of taxation on the incentives to invest.

As a practical matter, in the fixed-p case, we take the gross rate of return, p, to be 10 percent. We then use equation (4) to calculate ρ which, through equations (7)-(9), will qive us an interest rate, i, for each case. Finally, we calculate r as $i-\pi$ and substitute it into equation (6) to get

the net rate of return. Alternatively, in the fixed-r case, we begin with an r of 5 percent. Substitution into (6) provides s, substitution into (7)-(9) provides the discount rate ρ, and substitution into (4) provides p.

The interaction between inflation and the tax system is one of the most important aspects of the effects of taxes on savings and investment. The expected rate of inflation enters into both the p equation (4) and the s equation (6). In order to accomodate these expectations, we calculate effective tax rates for three different inflation rates (just as in KF). First, a zero rate provides a benchmark against which to judge other figures, and it describes the impact the tax system would have if it were fully indexed. Second, we look at an inflation rate of ten percent as a reasonable upper bound for the 1980s. Finally, we use 6.77 percent as the "actual" inflation for the U.S., calculated as the average rate of increase of the price deflator for consumer and investment goods over the ten year period 1970-79. We considered updating this figure by calculating the same average over the period from 1975 to 1985, but the new "actual" inflation rate turned out to be only about one percentage point lower. Since this difference is small, we used 6.77 percent again for comparability with results in KF. In addition, results for any inflation rate can be approximated by interpolating between results for inflation rates of zero and ten.

Each hypothetical investment under consideration is described by a unique combination of four characteristics. These characteristics include the asset in which funds are invested, the industry of the project, the way the project is financed, and the ultimate recipient of the returns. In turn, there exist three alternatives for each characteristic. More

specifically, the first asset category is machinery, which includes plant, equipment, and vehicles. The second asset is buildings, and the third asset is inventories. We are only considering tangible reproducible assets and thus exclude land, R&D, and other intangible assets.

The first industry is manufacturing, which consists of the SIC industry numbers 13-64. Second, other industry contains construction, transportation, communications and utilities. Third, commerce, includes trade and services and corresponds to SIC numbers 69 and 72-77.

The three sources of finance are debt, which includes both bond issues and bank borrowing, new share issues, and retained earnings. The three ownership categories are households, tax-exempt institutions, and insurance companies. The primary motivation for this three-way ownership classification is the different tax treatments that they receive, even though the funds are indirectly owned by households in all cases. The household category includes the household ownership of funds through taxed intermediaries such as banks. The second category includes indirect tax-exempt ownership through pension funds, the pension business of life insurance companies and charities. Finally, the third category includes funds invested as part of contractual savings made by households via the medium of insurance companies, principally life insurance policies. In combination, with three assets, three industries, three sources of finance, and three ownership categories, there exist a total of 81 combinations of distinct investments that are examined.

In section IV we compute the marginal effective tax rate for each combination as well as their distribution. In order to plot the distribution of tax rates, we need to know the proportion of investment identified with any given combination. We assume that the marginal increase

in investment under consideration is proportional to the existing distribution of net capital stocks among assets and industries. Further, we assume that the saving required to finance investment is proportional to the existing ownership patterns. This enables us to determine the weights that apply to each combination. Thus, by aggregating with the appropriate weights, we can calculate marginal effective tax rates for every subset of investment projects.

To illustrate, let k denote a particular combination involving debt financed investment. There are 27 such combinations. If α_k denotes the weight applicable to the kth combination, we can calculate effective tax rates for capital income generated by debt financed investments in the following way. The mean tax wedge for this subset is,

$$\bar{w} = \sum_{k}^{27} (p_k - s_k)\alpha_k = \bar{p} - \bar{s} \quad . \tag{10}$$

Then the marginal effective tax rate is

$$\bar{t} = \frac{\bar{w}}{\bar{p}} \quad . \tag{11}$$

In a similar way, we compute the rates for all the other subsets. By using the weights for all 81 combinations together, we get the overall mean marginal effective tax rate.

III. Data and Parameters

There have been two major tax reform acts in the 1980s that have affected the treatment of the various assets and the distortions introduced by the tax system. The Economic Recovery Tax Act (ERTA) of 1981 reduced personal rates and assigned lifetimes for assets to a smaller number of classes. These lifetimes were shorter for the most part, so the present value of depreciation allowances were greater. The Tax Reform Act (TRA) of 1986 reduced personal rates, decreased the statutory corporate rate from 0.46 to 0.34, and repealed the investment tax credit. In the interim years, a few other adjustments of the tax code took place. All these policy changes will be described below.

The capital stock weights are derived from Jorgenson and Sullivan (1981) and Fraumeni and Jorgenson (1980), calculated by the perpetual inventory method for the year 1977. We use the same weights as those in KF. As shown in Table III.1, about 44 percent of the capital stock is used in manufacturing, 25 percent is in commerce, and the remaining 31 percent is in the other industry category. More than half (54 percent) of the total corporate capital excluding land is in buildings, whereas inventories and equipment share the rest equally.

According to Table III.2, three-fourths of the financing for investments in manufacturing comes from retained earnings, and only 20 percent comes from debt.[3] These proportions are more equal in commerce (40 percent debt and 55 percent retained earnings) and other industry (48

[3]We use COMPUSTAT data to calculate market values of debt and equity in each industry, as described in Gordon and Malkiel (1981) and KF.

percent each). These proportions also come from KF, so that we can replicate the results for 1980 before drawing comparisons to later years.[4]

The proportions of debt and equity holdings of each ownership category are shown in Table III.3. Households and tax-exempt institutions hold almost equal proportions of debt and equity, while insurance companies hold mostly debt. In order to concentrate on tax changes by themselves, none of these weighting parameters are allowed to vary during the time period. The following subsections describe the other parameters and features of the tax code that do change during the 1980-86 period.

A. The Corporate Rates

The top federal statutory rate of 0.46 is used for marginal corporate income for all years until 1986. State corporate taxes are deductible at the federal level, and the weighted average of the states' top brackets is 6.6 percent. Therefore, τ is $0.46 + 0.066(1 - 0.46)$ or 49.5 percent. The 1986 Act lowered the top statutory corporate tax rate to 0.34, so the same calculation provides a combined rate of 38.3 percent. Although most corporations do not reach the top statutory rate bracket, the bulk of corporate capital is held by those that do.

B. Property and Wealth Taxes

Thousands of local jurisdictions each set their own statutory property tax rates. Using data from the Advisory Commission on Intergovernmental Relations, Jorgenson's 1977 capital stock matrix, and estimated tax payments

[4]The low 5 percent proportion for new share issues reflects Flow of Funds data on actual financing and is consistent with the low weight on dividend taxes in the "new view" of Auerbach (1979), Bradford (1981), and King (1977). New investment might have to use proportionately more new share issues, however, reflecting the "old view" of dividend taxes.

in 1977, we calculate the following average tax rates for businesses. For equipment and inventories w_c is 0.00768, and for structures w_c is 0.01126. These rates are assumed to hold for all seven years. In addition, the personal wealth tax rates (w_p) are taken to be zero throughout. This parameter could be used for estate taxes, but these are a very small source of revenue in the U.S., and the Economic Recovery Tax Act of 1981 raised the estate tax exemption to $600,000.

C. The Personal Tax Rates

The data on marginal tax rates for households is made available from the Treasury and the TAXSIM simulations of the NBER.[5] The procedures of the NBER model are described in Feldstein and Frisch (1977) and in Feenberg and Rosen (1983). Essentially, it weights marginal rates for 25,000 households by each different source of income. Table III.4 provides a summary of the various rates for each year. The first row shows tax rates on wage income for comparison purposes only. The second row shows the statutory rates applicable to interest income. These include an additional 0.05 to account for state taxes. Also, financial intermediaries hold corporate debt but do not pay interest on demand deposits. Instead, they provide services to depositors, a form of return to households that is not subject to tax. We therefore multiply the combined federal and state rate by the ratio of interest-bearing direct and indirect loans of households to corporations

[5]The Treasury provided estimates of the household rates for all seven years. However, for comparability with KF we want to use the TAXSIM rate for 1980. We therefore use the Treasury estimates to indicate how the 1980 TAXSIM rate would change over the period. That is, later years' Treasury numbers were multiplied by the ratio of the TAXSIM rate for 1980 to the Treasury rate for 1980.

divided by total direct and indirect loans of households to corporations. This ratio was calculated to be 0.8738 in KF.[6] Implicit here is the assumption that the same rate of interest applies both to borrowing and lending. To take an example, for 1980, the federal rate on interest of households was .275, and the combined federal and state rate was 32.5 percent. With the adjustment for banks, m is 0.285 as shown in the table. In 1981 it became 25.8 percent and, under the TRA, 22.4 percent. The third row in the Table III.4 shows that the combined statutory rate for dividends in 1980 is 47.5 percent, decreased significantly in 1981 and again in 1986.

The statutory capital gains rate from the TAXSIM model for 1980 is 28 percent, but KF uses a 14 percent rate to account for step-up of basis at death and the selective realization of losses and gains. Also, capital gains are taxed only upon realization and thus offer a deferral advantage that depends on the average length of the holding period. As explained in KF (see pp. 23-24 and 222), the 14 percent rate is approximately halved due to this advantage.

The effective marginal tax rate on nonprofit institutions is assumed to be zero. The reason is that contributions to retirement accounts are not taxable at personal rates. Since savings and interest earnings are taxed when retirement income is paid out, the treatment is equivalent to a consumption tax provided the individual remains in the same bracket. Contributions to nonqualified accounts are relatively small, and the

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[6]Two other alternative adjustments have been suggested but are not used here. The first takes explicit account of the interest ceiling on time deposits. The other was put forth by Feldstein and Summers (1979). Both of these are described in detail in KF.

taxation of interest income can be postponed until retirement. In this case the present value of those tax payments is very small.

The taxation of income received through insurance companies follows some complicated procedures described in KF (pp. 227-234). For our purposes, the tax rates for the years 1980 through 1983 are shown in Table III.5 to be 6.9 percent for dividends, 28 percent statutory rate for retained earnings, and $0.149 + 3.88\pi$ for debt, where π is the inflation rate. In 1984 the complicated procedures were replaced by a simple 20 percent exclusion, so the effective rate on interest income is 80 percent of the statutory 46 percent tax rate. Thus, it is taxed at 0.368, and the dependence on inflation is eliminated. The following year that rate remained the same, and in 1986 the 20 percent exclusion was repealed when the statutory rate was lowered for all corporations to 34 percent. Intercorporate dividends receive an 80 percent deduction from the corporate rate in 1986, and are thus taxed at 6.8 percent. The special rate for capital gains was repealed.

D. Investment Tax Credits

All qualifying equipment and public utility structures received a statutory investment tax credit (ITC) of 10 percent in 1980. Two-thirds of that credit was allowed for equipment with a 5 or 6 year life, and one-third was allowed for equipment with a 3 or 4 year life. As shown in Table III.6, under ERTA the rate for autos increased from 0.033 to 0.06, while all other equipment received the full 10 percent ITC. The Tax Reform Act of 1986 repeals the ITC altogether. We assume that the companies under consideration have enough taxable profits to enable them to use those

credits, although in fact many companies do not.[7] Since the whole investment outlay qualifies for tax credit, the parameter f_3 is set to one.

E. Inventory Accounting

United States corporations are allowed to use any number of consistent accounting methods including Last-in First-out (LIFO) and First-in First-out (FIFO), but they are obligated to use the same method for profits reported to shareholders as they use for profits reported to the taxing authorities. In an environment with no inflation, the two methods yield identical figures and the choice between them should leave the firm indifferent. With inflation, however, FIFO profits appear to be higher than LIFO. Therefore, although firm managers might like to report FIFO profits to shareholders, taxes can be reduced by reporting LIFO profits to the IRS. Of the possible values that exist for our parameter, v, we set it equal to zero, assuming that firms act so as to minimize their tax liability. This assumption is consistent with the use of minimum lifetimes and maximum acceleration in the depreciation of assets, discussed below.

F. Depreciation Allowances

Estimates of the actual economic depreciation of the different assets are provided by Hulten and Wykoff (1981) and are shown in Table III.7. These are carefully distinguished from the tax lifetimes that are also shown for each year in Table III.7. The first twenty assets will be aggregated to form our machinery category, while the next fourteen assets will form our

[7]See, for example, Jorgenson and Sullivan (1981). For the effects of imperfect loss offsets, see Auerbach (1986) or Mayer (1986).

buildings category. Inventories are not shown in this table because they do not depreciate.

The lifetimes reported for 1980 stem from the estimates of the midpoints of the Asset Depreciation Range (ADR) found in Jorgenson and Sullivan (1981). More specifically, the ADR system allowed 20 percent longer or shorter lives for equipment (assets 1 – 20) and public utility structures (assets 27 – 31). Because of our assumption of optimizing tax practice, these assets are assigned lives that are 80 percent of ADR midpoints except where the use of a longer lifetime would reduce effective taxes through eligibility for a higher investment tax credit. Hence, these lifetimes are consistent with the ITC vector, shown for 1980 in Table III.6 column one, in that the three– and five–year assets get one–third and two–thirds of the full ITC, respectively.

Under the 1980 law, also, equipment and public utility structures were allowed double declining balance (DDB) with a switch to sum–of–the–years'–digits (SYD).[8] Other structures (assets 21–26 and 32–34) received 150 percent declining balance with a switch to straight line. Since capital consumption allowances are based on historical cost, we use the nominal after tax discount rate, ρ, to calculate their present value, A_z. This calculation accounts for the half year convention, annual allowances, and continuous discounting (see KF pp. 210–211).

The Economic Recovery Tax Act of 1981 introduced the Accelerated Cost Recovery System (ACRS) under which any depreciable asset fell into one of four classes and is given a tax life of three, five, ten, or fifteen years. These lifetimes, which are shown in Table III.7 column three, assigned a

[8]This combination is used here as tax–minimizing practice because it can be shown to provide the earliest possible depreciation deductions. See Shoven and Bulow (1975).

three-year life to autos, a five-year life to other equipment, a ten-year life to some gas and other public utility structures, and a fifteen-year life to railroads, telephone and telegraph, electric light and power, and all other structures. Machinery and public utilities were to receive DDB switching to SYD, as before, but depreciation was moved up from the last half year. As a result, the three-year class depreciated in only 2.5 years, the five-year class in 4.5 years, and so on. Other structures received 175 percent declining balance still switching to straight line.

In 1982, allowances for machinery and public utilities were cut back to 150 percent declining balance, switching to straight line rather than SYD. Further, the 1982 act decreased the depreciation basis by half of the investment tax credit. Other changes in 1984 and 1985 lengthened lifetimes for structures and are shown in Table III.7. In 1986, autos were moved from 3 to 5 years, and some other assets were moved from 5 to 7 or 10 years, but the depreciation method was accelerated to DDB. Some long-lived assets such as public utility structures received 15 or 20 years with 150 percent declining balance, while nonresidential structures got 31.5 year straight line.

All these changes in the tax laws are captured in the respective A_z parameters for each of the 34 assets. These values are then weighted appropriately to obtain the aggregate depreciation allowances for each of our three categories.[9] As explained earlier, each A_z is multiplied by the statutory corporate tax rate, τ, to provide the tax savings A_d. Finally, the parameter f_1 is set to one, indicating that all equipment and structures

[9]Appendix D of King and Fullerton (1984) describes how we weight the 34 values of A_z to the three categories.

depreciate for tax purposes as described above, and f_2 is set to zero to indicate no immediate free depreciation of investment.

IV. The Results

Our primary findings for each year concern the fixed-p calculations for the standard inflation rate of 6.77 percent. For 1980 the overall weighted marginal effective tax rate on corporate capital income in the United States is 37 percent. As anticipated, this figure matches exactly the one found in KF. The interpretation is that if all assets started with a gross return of 10 percent, and if all capital of all owners were increased by one dollar, then the present value of the expected tax would be 37 percent of the additional return. It is noteworthy that this effective rate is less than the 46 percent statutory corporate tax rate, because the effective rate incorporates many factors that tend to offset or increase overall taxes.

Table IV.1 shows the breakdown of this effective tax rate by asset, industry, source of finance, and ownership category, for the three inflation rates. The bottom row shows that the overall effective rate increases somewhat with inflation, from 32 percent with zero inflation to 38.5 percent with 10 percent inflation. To help explain this relationship, look at the rates that correspond to the source of finance categories. The effective rates for new shares and retained earnings increase steeply with inflation since the returns are taxed in nominal terms, but debt financed investment is subsidized at rates that also increase with inflation. This subsidy arises because corporations can deduct nominal interest at a 49.5 percent rate while recipients include it at a much lower 23.6 percent rate (averaged

over the three owners). The overall rates at the bottom of the table weigh the rates for the three sources of finance according to the proportions described in section III, so the two effects of inflation offset each other.

Under the fully phased-in 1981 law, the overall effective rate for actual inflation is shown in Table IV.2 to be a much lower 23.5 percent. This reduction is attributed primarily to two sources. First, an across the board reduction in personal tax rates was instituted by ERTA in an effort to stimulate the economy. Second, there was a considerable reduction in the depreciation lifetimes. As a result of these two factors plus the use of double declining balance and the ITC, equipment receives a subsidy of 8.5 percent. In addition, structures were previously taxed at 41.2 percent but under 1981 law are taxed at only 27.8 percent. A less significant decline to 44.4 percent occurred for inventories. As pointed out by Fullerton and Henderson (1984), the Economic Recovery Tax Act implied substantially disparate tax treatments for depreciable assets on the one hand, and for land and inventories on the other.

In 1982, the method of depreciation was cut back to 150 percent of declining balance for equipment and public utility structures, as reflected in the higher effective tax rates for machinery and structures shown in Table IV.3. Equipment moved from a 8.5 percent subsidy to an 8 percent tax, and structures increased to 31 percent. Inventories, which do not depreciate, were unaffected. As expected, then, the rates for all the different category breakdowns are higher. In particular, the "other industry" group moves from a small subsidy in 1981 to a 9.7 percent tax in 1982 because it includes public utilities. Thus the overall rate increased to 29 percent in 1982. Since there were no further changes the next year, the same rates are also applicable to 1983.

In evaluating the effects of the changes that took place in 1984, it helps initially to look at the first column in Table IV.4 for the rates at zero inflation. We want to abstract from the effect of inflation because the tax rate on interest income earned by insurance companies through 1983 depended explicitly on the rate of inflation. We find that all the effective rates have increased from the previous year for two reasons. First, the tax lifetimes for most structures were increased from 15 to 18 years, thus reducing the present value of the depreciation allowances for these assets. Second, the tax rate on interest income earned by insurance companies rose to 36.8 percent. In addition, its previous dependence on the rate of inflation was eliminated. Hence, moving to the rates under actual inflation, we see that both the rate for insurance companies and the overall rate have fallen from the previous year, to 14 and 28.4 percent, respectively.

The results for 1985 are very similar to those in 1984, but slightly higher as seen in Table IV.5. The reason is that the lifetimes of all structures besides public utilities were extended to 19 years. Consequently, the effective tax rates for machinery and inventories remained the same, whereas the rate for structures rose to 31.4 percent. This change pushed the overall rate for 1985 to 28.6 percent.

The Tax Reform Act of 1986 reduced the differences in the tax treatment of the various assets. In that spirit, the investment tax credit was repealed. The statutory corporate rate was decreased to 34 percent, and the lifetimes for most assets were lengthened. In the fixed-p case of Table IV.6, these changes translate into much higher effective tax rates for machinery, a smaller dispersion among the rates of the three asset classes, and an overall rate of 42 percent. It is interesting that, for the first

time in the seven years we examined, the overall effective rate is higher than the statutory corporate rate. That is, largely because of ITC repeal, the combination of corporate taxes and personal taxes is now greater than the corporate rate by itself.

As seen in Table IV.6, the returns to debt financed investments are now taxed rather than subsidized, at low inflation rates, because corporations deduct interest at a much lower corporate tax rate. This effect is partially offset by the smaller reduction in the personal rates on interest income. The effective rates for new share issues fell a little due to the lower statutory rates on dividends of households and insurance companies, while capital gains face a higher effective rate than before.

Calculations for the fixed-r case in 1985 and 1986 are shown in Tables IV.7 and IV.8.[10] These results show effective tax rates for an equilibrium in which investors have been allowed to adjust their behavior in response to the various incentives. As such, these rates become more relevant in assessing the welfare loss due to the taxation of capital income. The rates for 1985 in Table IV.7 are higher than in the fixed-p case, for almost every breakdown, but the same pattern persists. Debt is still subsidized at rates that grow rapidly with inflation, and machinery is still taxed at lower rates than the other assets. Effects of the 1986 law are also similar to those in the fixed-p case. For 1986 compared to 1985, an overall rate of 50 percent instead of 42 implies an additional intertemporal distortion that has to be weighed against the welfare gains arising from the more equal treatment of the different assets.[11]

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[10] These results are comparable to those found in Fullerton (1987) for the individual arbitrage case.

[11] One could calculate Harberger (1966) triangles and measure the welfare loss due to the distortion in the allocation of resources between the corporate and the noncorporate sector, or between machinery and buildings.

One very interesting and important aspect of this study is not demonstrated in the calculations presented thus far. The overall effective tax rates conceal the distribution of individual tax rates within each year. To illustrate these differences, we present histograms for the fixed-p case and the actual inflation rate for 1985 and 1986. Figure IV.1 shows the histogram for 1985, where the height of each bar is the sum of the capital stock weights for any individual combinations that are taxed at effective rates falling in each 10 percent interval between -120 and +100 percent.[12] We find that 22.6 percent of the capital stock is subsidized, while 32 percent of the capital stock is taxed at rates 80 percent or higher. The highest subsidy in 1985 is 114.7 percent, received by investment projects in assets in the "other industry" category, financed by debt sold to tax-exempt insitutions.

The histogram for 1986 shown is in Figure IV.2. An important point is that the dispersion is much smaller in 1986. This result suggests a considerable reduction in the distortions introduced by the tax system. Also, in 1985 the largest fraction of capital income, 28.6 percent, was taxed at rates that fell between 70 and 80 percent. In 1986, despite the increase in the overall mean effective tax rates, the largest fraction of capital, 26.7 percent, is now taxed at rates that fall between 60 and 70 percent. In other words, the increase in the overall average comes from reducing subsidies on some capital rather than from increasing the tax on most capital.

Examples include Gravelle (1982), Shoven (1976), or Fullerton, Shoven, and Whalley (1983).

[12]The histogram for 1985 is fairly representative of all the preceding years as well. A histogram for 1980 is presented in KF.

Finally, we look at the effects of inflation on the effective tax rates. Figure IV.3 shows how the overall rate changes as the rate of inflation varies from zero to ten percent in the years 1980, 1985, and 1986. The rates for 1980 and 1986 lie everywhere above the rate for 1985, and exhibit a moderate tendency to rise with inflation. The schedule for 1985 is almost flat.

However, these schedules are weighted averages of the various categories and thus suppress the considerable variation of rates among categories. To illustrate, we present figures to show the sensitivity of the rates for each of the three assets with respect to inflation. Figure IV.4 shows that in 1985 the difference among the rates for the three assets is very big at low rates of inflation. This difference decreases with inflation. The rate for machinery rises, while the rate for buildings remains the same and the rate for inventories falls slightly.

The Tax Reform Act of 1986 brought the rates for the three assets very close together. As seen in Figure IV.5, these rates differ much less than in 1985 when there is no inflation, and they tend to converge as the rate of inflation increases to ten percent. Once again, we see that the effect of the reform was to eliminate much of the interasset distortion.

V. Concluding Remarks

We examined the tax laws that affected capital income in the corporate sector of the U.S. economy from 1980 to 1986. We estimated marginal effective tax rates for hypothetical investment projects during that period in order to quantify the incentive effects of the tax system. From the

plethora of numbers presented thus far, one can easily lose sight of the important questions that we have been able to answer. We therefore summarize the major findings of this study.

Focusing on the overall effective rates under actual inflation in the fixed-p case, we saw that they started at around 37 percent in 1980, remained almost ten percentage points lower until 1986, and then rose back to 42 percent. It would appear that in 1981, when the rates were lowest, the tax system created a more favorable environment for investment and caused fewer intertemporal distortions than in any other year. However, the histograms provided in Figures IV.1 and IV.2 suggest that the distribution of rates needs to be evaluated as well.

When a substantial proportion of the capital stock is being subsidized at different rates, as it was in 1985, there may be considerable misallocation of resources and biased economic growth. This misallocation could imply substantial welfare losses. In 1986, the tax rates were distributed more uniformly and hence may have removed a welfare loss.

In addition, we found that equipment constantly received a more favorable tax treatment than the other assets because of the investment tax credit, until 1986. Debt financing was subsidized because of the deductibility of interest payments by corporations. Repeal of the ITC and reduction of the corporate tax rate in 1986 helped reverse both of these differences.

Capital income accruing to insurance companies was taxed at rates that increased steeply with inflation. That effect was eliminated in 1984. In general, the overall effective tax rates do not show much sensitivity to the rate of inflation. However, this insensitivity is still the result of offsetting effects. Without indexation of depreciation or interest income,

inflation still serves to raise the effective tax rate on assets depreciated on a historical cost basis and to lower the effective tax rate on assets financed by issuing debt.

Table III.1

Proportions of Corporate Capital Stock by Asset and Industry

Asset	Sector			Total
	Manufacturing	Other Industry	Commerce	
Machinery	.0867	.0965	.0415	.2247
Buildings	.2167	.1970	.1248	.5385
Inventories	.1350	.0176	.0842	.2368
Total	.4384	.3111	.2502	1.0000

Source: King and Fullerton (1984). Aggregation from unpublished data described in Jorgenson and Sullivan (1981) and in Fraumeni and Jorgenson (1980).

Table III.2

Source of Finance Proportions for Each Industry

Industry	Debt	New Share Issues	Retained Earnings	Total
Manufacturing	.1981	.0592	.7427	1.000
Other industry	.4847	.0381	.4772	1.000
Commerce	.3995	.0443	.5562	1.000

Source: King and Fullerton (1984), as derived and described in the text.

Table III.3

Proportional Holdings of Debt and Equity for each Ownership Category

	Debt	Equity
Households	.6094	.7433
Tax-Exempt Institutions	.2371	.2154
Insurance Companies	.1534	.0412
Total	1.000	1.000

Source: King and Fullerton (1984), as derived and described in the text.

Table III.4

Personal Marginal Tax Rates for Households[a]

	1980	1981-85	1986
Wages	.324	.312	.271
Interest[b]	.285	.258	.224
Dividends	.475	.396	.320
Realized Capital Gains	.140	.118	.220

a: Combined federal and state marginal tax rates.
b: Tax rates for interest income have been adjusted for financial intermediation. See text.

Source: Calculations from NBER's tax simulation (TAXSIM) model and the U.S. Department of Treasury. See section III.C.

Table III.5

Personal Marginal Tax Rates for Insurance Companies[a]

	1980-83	1984-85	1986
Interest	$.149+3.88\pi$	.368	.340
Dividends	.069	.069	.068
Realized Capital Gains	.280	.280	.340

a: Combined federal and state marginal tax rates.

Source: King and Fullerton (1984). See, also, text.

Table III.6

Investment Tax Credit by Asset Class

Asset Class	1980	1981-85	1986
1. Furniture and fixtures	0.100	0.10	0.0
2. Fabricated metal products	0.100	0.10	0.0
3. Engines and turbines	0.100	0.10	0.0
4. Tractors	0.067	0.10	0.0
5. Agricultural machinery	0.100	0.10	0.0
6. Construction machinery	0.100	0.10	0.0
7. Mining and oilfield machinery	0.100	0.10	0.0
8. Metalworking machinery	0.100	0.10	0.0
9. Special industry machinery	0.100	0.10	0.0
10. General industrial machinery	0.100	0.10	0.0
11. Office and computing machinery	0.100	0.10	0.0
12. Service industry machinery	0.100	0.10	0.0
13. Electrical equipment	0.100	0.10	0.0
14. Trucks, buses, and trailers	0.067	0.10	0.0
15. Autos	0.033	0.06	0.0
16. Aircraft	0.100	0.10	0.0
17. Ships and boats	0.100	0.10	0.0
18. Railroad equipment	0.100	0.10	0.0
19. Instruments	0.100	0.10	0.0
20. Other equipment	0.100	0.10	0.0
21. Industrial buildings	0.0	0.0	0.0
22. Commercial buildings	0.0	0.0	0.0
23. Religious buildings	0.0	0.0	0.0
24. Educational buildings	0.0	0.0	0.0
25. Hospitals	0.0	0.0	0.0
26. Other nonfarm buildings	0.0	0.0	0.0
27. Railroads	0.100	0.10	0.0
28. Telephone and telegraph	0.100	0.10	0.0
29. Electric light and power	0.100	0.10	0.0
30. Gas	0.100	0.10	0.0
31. Other public utilities	0.100	0.10	0.0
32. Farm structures	0.0	0.0	0.0
33. Mining, shafts, and wells	0.0	0.0	0.0
34. Other nonresidential structures	0.0	0.0	0.0

Source: Fullerton and Henderson (1984), as described in the text.

Table III.7

Depreciation and Tax Lifetimes by Asset Class

Asset Class	Hulten/Wykoff Depreciation Rates	Lifetimes			
		1980	1981-83	1984	1985	1986
1. Furniture and fixtures	0.1100	8.00	5.0	5.0	5.0	7.0
2. Fabricated metal products	0.0917	10.00	5.0	5.0	5.0	7.0
3. Engines and turbines	0.0786	12.48	5.0	5.0	5.0	7.0
4. Tractors	0.1633	5.00	5.0	5.0	5.0	5.0
5. Agricultural machinery	0.0971	8.00	5.0	5.0	5.0	7.0
6. Construction machinery	0.1722	7.92	5.0	5.0	5.0	5.0
7. Mining and oilfield machinery	0.1650	7.68	5.0	5.0	5.0	5.0
8. Metalworking machinery	0.1225	10.16	5.0	5.0	5.0	7.0
9. Special industry machinery	0.1031	10.16	5.0	5.0	5.0	7.0
10. General industrial machinery	0.1225	9.84	5.0	5.0	5.0	7.0
11. Office and computing machinery	0.2729	8.00	5.0	5.0	5.0	7.0
12. Service industry machinery	0.1650	8.24	5.0	5.0	5.0	7.0
13. Electrical equipment	0.1179	9.92	5.0	5.0	5.0	7.0
14. Trucks, buses, and trailers	0.2537	5.00	5.0	5.0	5.0	5.0
15. Autos	0.3333	3.00	3.0	3.0	3.0	5.0
16. Aircraft	0.1833	7.00	5.0	5.0	5.0	5.0
17. Ships and boats	0.0750	14.40	5.0	5.0	5.0	10.0
18. Railroad equipment	0.0660	12.00	5.0	5.0	5.0	5.0
19. Instruments	0.1473	8.48	5.0	5.0	5.0	5.0
20. Other equipment	0.1473	8.16	5.0	5.0	5.0	5.0
21. Industrial buildings	0.0361	28.80	15.0	18.0	19.0	31.5
22. Commercial buildings	0.0247	47.60	15.0	18.0	19.0	31.5
23. Religious buildings	0.0188	48.00	15.0	18.0	19.0	31.5
24. Educational buildings	0.0188	48.00	15.0	18.0	19.0	31.5
25. Hospitals	0.0233	48.00	15.0	18.0	19.0	31.5
26. Other nonfarm buildings	0.0454	30.90	15.0	18.0	19.0	31.5
27. Railroads	0.0176	24.00	15.0	15.0	15.0	20.0
28. Telephone and telegraph	0.0333	21.60	15.0	15.0	15.0	20.0
29. Electric light and power	0.0300	21.60	15.0	15.0	15.0	20.0
30. Gas	0.0300	19.20	10.0	10.0	10.0	15.0
31. Other public utilities	0.0450	17.60	10.0	10.0	10.0	15.0
32. Farm structures	0.0237	25.00	15.0	18.0	19.0	20.0
33. Mining, shafts, and wells	0.0563	6.80	5.0	5.0	5.0	5.0
34. Other nonresidential structures	0.0290	28.20	15.0	18.0	19.0	31.5

Source: Depreciation rates are from Hulten and Wykoff (1981). For public utility structures (assets 27-31), Jorgenson and Sullivan (1981) provide estimates based on the Hulten/Wykoff methodology. Lifetimes are from Fullerton and Henderson (1984) and are described in the text.

Table IV.1

Marginal Effective Tax Rates for 1980, Fixed-p Case

	Inflation Rate		
	Zero	**10%**	**Actual (6.77%)**
Asset			
Machinery	3.8	22.8	17.5
Buildings	35.6	41.9	41.2
Inventories	50.9	45.5	47.0
Industry			
Manufacturing	44.4	55.1	52.8
Other industry	10.0	15.8	14.6
Commerce	38.0	37.5	38.2
Source of Finance			
Debt	-1.8	-22.2	-16.2
New share issues	61.1	104.6	91.2
Retained earnings	48.5	66.6	62.4
Owner			
Households	44.2	61.9	57.6
Tax-exempt institutions	4.1	-37.2	-21.5
Insurance companies	4.2	44.4	23.4
Overall	32.1	38.5	37.3

Table IV.2

Marginal Effective Tax Rates for 1981, Fixed-p Case

	Inflation Rate		
	Zero	**10%**	**Actual (6.77%)**
Asset			
Machinery	-18.1	-4.4	-8.5
Buildings	22.8	28.8	27.8
Inventories	49.8	42.1	44.4
Industry			
Manufacturing	33.8	41.7	40.0
Other industry	-4.0	-.1	-1.0
Commerce	25.5	24.8	25.3
Source of Finance			
Debt	-16.5	-34.8	-29.9
New share issues	51.0	89.1	77.3
Retained earnings	37.5	52.0	48.7
Owner			
Households	32.4	45.9	42.6
Tax-exempt institutions	-8.6	-46.9	-32.7
Insurance companies	-9.6	37.0	13.6
Overall	20.0	24.5	23.5

Table IV.3

Marginal Effective Tax Rates for 1982-1983, Fixed-p Case

	Inflation Rate		
	Zero	**10%**	**Actual (6.77%)**
Asset			
Machinery	-2.1	12.5	8.2
Buildings	26.0	31.7	30.9
Inventories	49.8	42.1	44.4
Industry			
Manufacturing	36.6	44.8	43.0
Other industry	6.9	10.4	9.7
Commerce	28.4	27.9	28.4
Source of Finance			
Debt	-7.9	-26.8	-21.7
New share issues	53.9	92.1	80.4
Retained earnings	41.4	56.1	52.8
Owner			
Households	36.9	50.5	47.3
Tax-exempt institutions	-1.3	-39.3	-25.2
Insurance companies	-1.9	42.1	19.6
Overall	25.3	29.9	29.0

Table IV.4

Marginal Effective Tax Rates for 1984, Fixed-p Case

	Inflation Rate		
	Zero	**10%**	**Actual (6.77%)**
Asset			
Machinery	-1.6	8.9	6.4
Buildings	28.0	30.0	30.9
Inventories	49.9	40.0	43.3
Industry			
Manufacturing	37.9	45.4	44.0
Other industry	7.6	4.6	6.9
Commerce	30.1	25.0	27.7
Source of Finance			
Debt	-5.5	-40.8	-28.0
New share issues	54.5	92.8	81.0
Retained earnings	41.9	60.1	55.2
Owner			
Households	36.0	49.7	46.2
Tax-exempt institutions	-.3	-35.4	-22.6
Insurance companies	18.3	10.4	14.1
Overall	26.5	27.6	28.4

Table IV.5

Marginal Effective Tax Rates for 1985, Fixed-p Case

	Inflation Rate		
	Zero	10%	Actual (6.77%)
Asset			
Machinery	-1.6	8.9	6.4
Buildings	28.5	30.5	31.4
Inventories	49.9	40.0	43.3
Industry			
Manufacturing	38.2	45.8	44.3
Other industry	7.6	4.6	6.9
Commerce	30.5	25.4	28.0
Source of Finance			
Debt	-5.2	-40.6	-27.7
New share issues	54.7	93.0	81.2
Retained earnings	42.1	60.3	55.4
Owner			
Households	36.2	49.9	46.4
Tax-exempt institutions	.0	-35.1	-22.2
Insurance companies	18.6	10.6	14.4
Overall	26.8	27.9	28.6

Table IV.6

Marginal Effective Tax Rates for 1986, Fixed-p Case

	Inflation Rate		
	Zero	**10%**	**Actual (6.77%)**
Asset			
Machinery	29.6	41.9	38.9
Buildings	38.2	43.3	43.1
Inventories	44.2	41.7	42.8
Industry			
Manufacturing	43.9	53.1	51.1
Other industry	28.8	30.9	31.3
Commerce	37.9	38.8	39.5
Source of Finance			
Debt	17.4	-1.7	5.5
New share issues	53.3	84.0	74.7
Retained earnings	47.6	63.7	59.6
Owner			
Households	43.9	58.0	54.4
Tax-exempt institutions	19.5	-3.1	5.5
Insurance companies	34.2	35.9	36.3
Overall	37.7	42.6	42.1

Table IV.7

Marginal Effective Tax Rates for 1985, Fixed-r Case

	Inflation Rate		
	Zero	**10%**	**Actual (6.77%)**
Asset			
Machinery	-28.6	21.7	12.9
Buildings	35.7	46.2	45.2
Inventories	53.9	48.7	50.8
Industry			
Manufacturing	43.9	56.6	54.1
Other industry	9.9	14.8	16.4
Commerce	37.7	37.3	39.0
Source of Finance			
Debt	-2.3	-491.5	-129.3
New share issues	56.1	80.5	75.9
Retained earnings	44.5	64.0	59.9
Owner			
Households	43.3	69.7	63.1
Tax-exempt institutions	9.4	-40.0	-21.9
Insurance companies	22.5	-.7	11.6
Overall	34.4	42.8	41.9

Table IV.8

Marginal Effective Tax Rates for 1986, Fixed-r Case

	Inflation Rate		
	Zero	**10%**	**Actual (6.77%)**
Asset			
Machinery	35.4	51.7	48.5
Buildings	43.3	52.1	51.2
Inventories	48.1	48.6	48.9
Industry			
Manufacturing	47.6	58.4	56.4
Other industry	35.1	41.4	41.0
Commerce	42.9	47.4	47.3
Source of Finance			
Debt	23.0	-25.9	-2.3
New share issues	54.1	74.5	70.3
Retained earnings	49.6	63.9	61.1
Owner			
Households	48.7	67.7	63.2
Tax-exempt institutions	26.0	-.7	9.3
Insurance companies	38.1	41.3	41.8
Overall	43.0	51.2	50.1

Figure IV.1
Proportion of Investment Taxed at Each Rate
in the Fixed-p Case for 1985

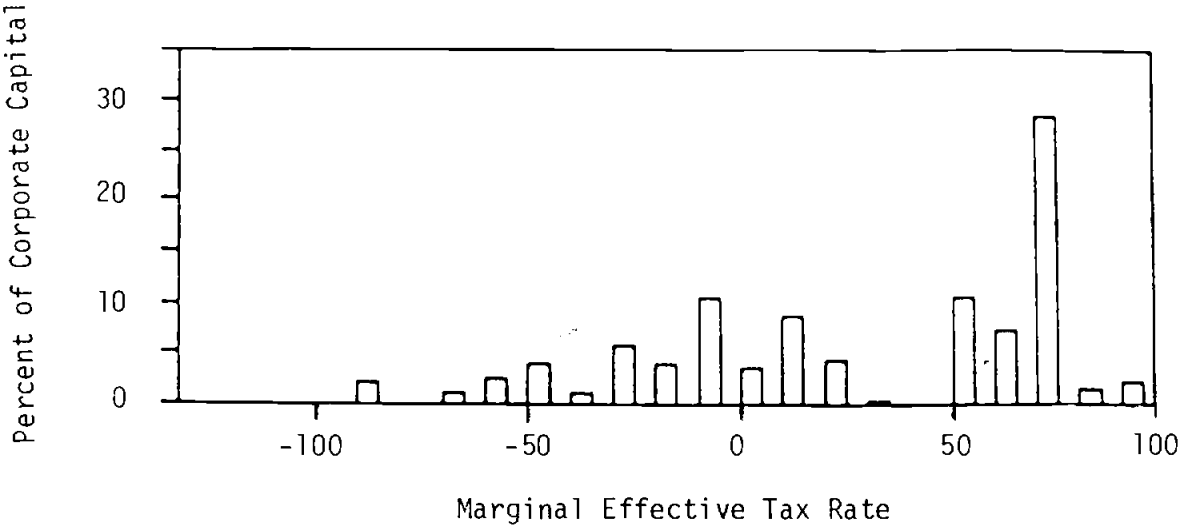


Figure IV.2
Proportion of Investment Taxed at Each Rate
in the Fixed-p Case for 1986

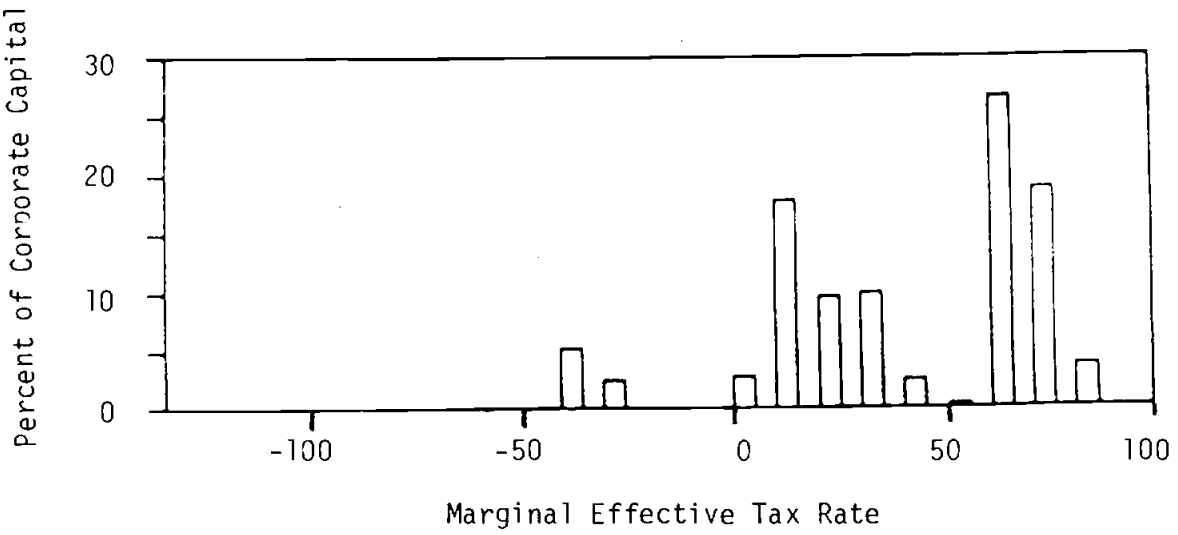


Figure IV.3
Overall Marginal Effective Tax Rates as Inflation Varies

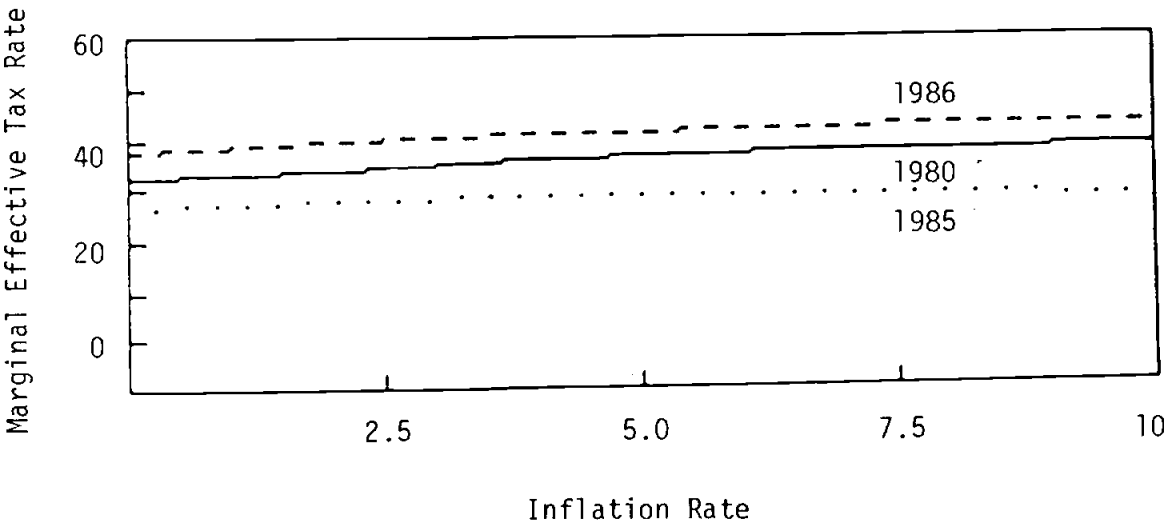


Figure IV.4
Marginal Effective Tax Rates in 1985 as Inflation Varies

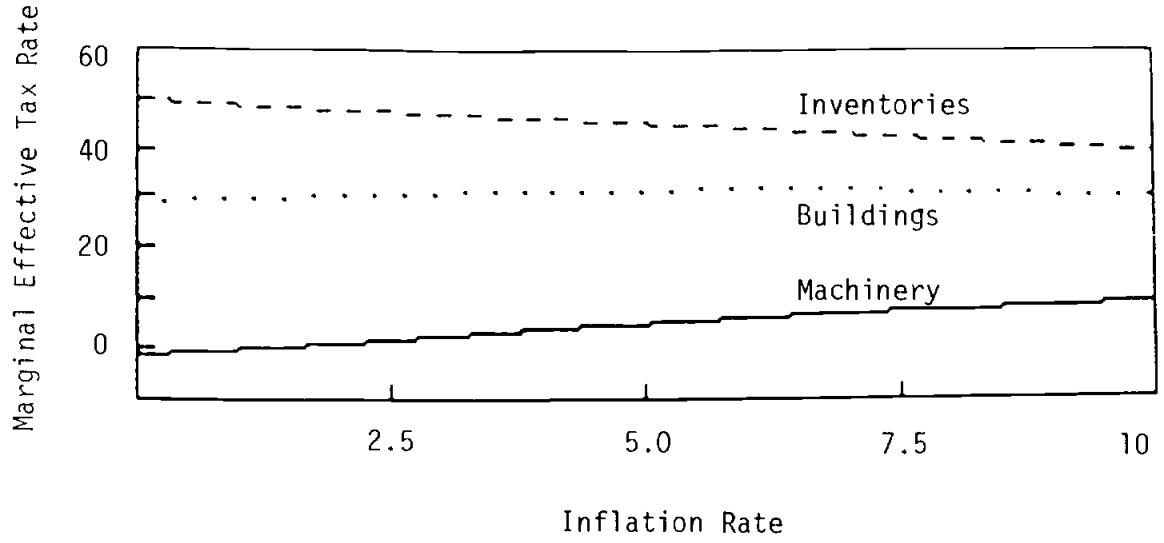
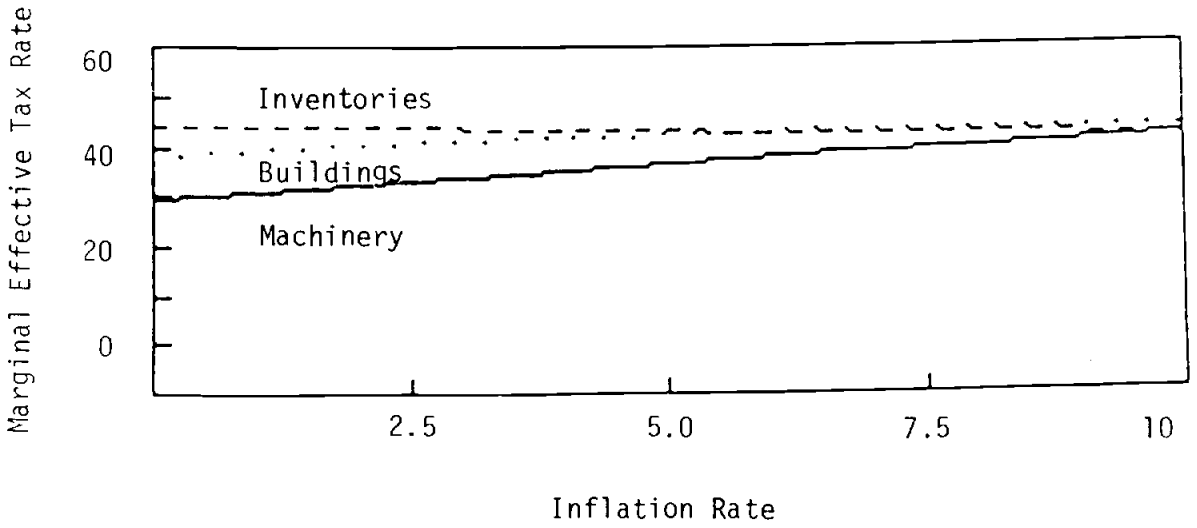


Figure IV.5
Marginal Effective Tax Rates in 1986 as Inflation Varies



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