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WHY HAVE CORPORATE
TAX REVENUES DECLINED?

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Why Have Corporate Tax Revenues Declined?

ABSTRACT

This paper examines the source of changes in corporate tax revenues during the last twenty-five years. It finds that legislative changes explain less than half of the revenue decline during this period. Falling corporate profits have had a larger influence on revenue collections than all legislative changes taken together, a result that is often obscured in studies focusing solely on the average corporate tax rate. Changes in capital recovery provisions are the most important legislative factor influencing corporate tax revenues, especially in the last five years.

The paper also considers the impact of the Tax Reform Act of 1986. The new law will increase the average tax rate on corporate profits by approximately 10 percent. By 1990, the average tax rate will equal its level in the late 1970s, although it will remain substantially below its level in the 1960s and the early 1970s.

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Corporate income tax revenues have declined dramatically during the last two decades. The corporate tax accounted for almost twenty percent of federal receipts during the 1960s, compared with only seven percent of federal receipts in the last five years. Federal corporate taxes averaged 3.9 percent of GNP during the first five years of the 1960s, 2.7 percent of GNP for the first five years of the 1970s, and only 1.4 percent of GNP for the first five years of the 1980s. In 1985, the tax to GNP ratio was less than half what it was ten years ago, and only one quarter as large as in 1955. In 1982, real corporate tax payments were lower than in any year since 1940. Although corporate taxes in each of the last three years were substantially greater than in 1982, the average level of tax receipts remains at its postwar low.

The erosion of corporate tax revenues is widely regarded as the result of legislative changes. For example, a frequently cited study by McIntyre (1984) argues:

The decline of the corporate tax began with the adoption of the investment tax credit in the 1960s, and continued into the 1970s as Congress adopted one loophole after another in response to corporate lobbyists... the largest single blow to the corporate tax came in 1981 with the passage of ... the Accelerated Cost Recovery System, which opened up massive new possibilities for corporate tax avoidance. [p.1]

This viewpoint clearly influenced the architects of the recently-enacted Tax Reform Act of 1986. The new law's stringent corporate minimum tax of 20 percent, coupled with significant reductions in capital recovery allowances, will raise corporate taxes by \$120 billion during the next five years.

This paper examines why corporate taxes have declined. It decomposes

movements in federal tax receipts into components attributable to changes in tax rates, changes in tax preferences, changes in corporate profitability, and other factors. The results suggest that while legislative changes have been important contributors to the decline of corporate tax revenues, they account for less than half of the change since the mid-1960s. Reduced profitability, which has shrunk the corporate tax base, is the single most important cause of declining corporate taxes.

The paper is divided into five sections. The first section documents the decline in corporate tax revenues during the last three decades. Section 2 presents a simple division of changes in corporate taxes into components due to changes in tax rules and changes in the corporate tax base. It shows that during the last twenty years, while the average tax rate has fallen by nearly one third, corporate profitability has declined by a factor of two. Section 3 examines the factors which have been most important in reducing average corporate tax rates. It focuses on changes in capital recovery, inflation-induced misstatement of corporate profits, and various legislative changes. The fourth section examines the expected revenue gains under the Tax Reform Act of 1986, and presents preliminary evidence on how the bill will alter average tax rates. There is a brief conclusion.

1. The Withering Corporate Income Tax

The decline in corporate taxes played an important part in stimulating recent calls for tax reform. The withering of the corporate income tax, however, began long before the passage of the Economic Recovery Tax Act in

1981. Corporate tax payments as a share of GNP or the value of corporate assets have been declining for nearly three decades. This trend accelerated during the last five years, when real corporate taxes also declined.

Table 1 presents four measures of the net corporate tax payments by nonfinancial corporations. We measure tax payments net of refunds obtained by carrying current losses back to offset prior taxes, and including taxes collected as a result of audits or other retabulations. A detailed description of our data series is provided in the appendix. We focus on nonfinancial corporate firms (NFCs) because they were most significantly affected by the changes in capital recovery rules under ERTA. The NFCs accounted for eighty-nine percent of corporate tax revenues in 1984 and 1985, and movements in their tax payments track total taxes very closely. There are also a number of detailed tax provisions which affect financial firms (see Galper and Neubig (1983)) that we avoid by focusing on the NFCs.

The first column of Table 1 reports the NFC's real corporate tax payments, measured in 1986 dollars. These tax payments peaked at \$92.5 billion in 1968, and with the exception of three years in the late 1970s, have been substantially below this level ever since. Average tax payments by the NFCs were \$78.6 billion in the 1960s, \$76.4 billion in the 1970s, and \$49.6 billion for the last five years. The data demonstrate the recent decline in corporate tax revenues, however, since average payments for the 1976-80 period were 63 percent greater than average revenues in the last five years.

This decline in corporate taxes is even more remarkable when viewed in the context of the growing economy. The second and third columns in Table 1 describe corporate taxes relative to GNP and corporate assets. Corporate

Table 1

Federal Corporate Tax Revenues, 1959-1985

Year	Federal Receipts From NFCs (\$1986)	NFC Federal Taxes as a Percentage of:		
		GNP	Replacement Cost of Net NFC Assets	Federal Receipts
1959	73.7	3.94	4.74	21.6
1960	66.7	3.48	4.25	18.5
1961	66.9	3.41	4.22	18.4
1962	67.8	3.28	4.24	17.6
1963	75.0	3.49	4.65	18.3
1964	77.2	3.41	4.74	19.1
1965	85.9	3.58	5.17	20.1
1966	89.5	3.54	5.16	19.0
1967	80.9	3.10	4.38	16.6
1968	92.3	3.40	4.88	17.1
1969	85.9	3.09	4.42	14.9
1970	64.5	2.33	3.21	12.1
1971	67.4	2.36	3.29	12.9
1972	71.3	2.38	3.41	12.5
1973	80.0	2.54	3.69	13.1
1974	75.7	2.42	3.12	12.1
1975	66.4	2.15	2.53	11.6
1976	79.7	2.46	2.96	12.9
1977	83.9	2.47	3.04	12.8
1978	87.7	2.45	3.01	12.5
1979	81.8	2.23	2.66	11.1
1980	70.0	1.91	2.14	9.4
1981	57.3	1.54	1.68	7.4
1982	37.7	0.93	0.98	4.6
1983	47.4	1.26	1.39	6.5
1984	59.5	1.49	1.76	7.7
1985	50.0	1.22	1.51	6.2
Five Year Averages:				
1961-65	74.5	3.43	4.60	18.7
1966-70	82.6	3.09	4.41	16.0
1971-75	72.1	2.37	3.21	12.4
1976-80	80.6	2.31	2.76	11.8
1981-85	49.6	1.29	1.47	6.5

Notes: Data on tax receipts from the nonfinancial corporate sector are based on authors' calculations, which is described in the appendix.
Receipts are net of carryback refunds and audit-induced tax payments.

taxes averaged 3.7 percent of GNP during the 1960s, compared with 1.3 percent during the first half of the 1980s. In 1982, when corporate taxes reached their postwar low, they accounted for only 0.9 percent of GNP. An equally pronounced decline emerges from column three, which shows the ratio of tax payments by nonfinancial corporations to the net replacement value of their tangible assets. This asset measure is constructed by subtracting corporate debt outstanding from the replacement cost of corporate tangible assets, and provides a natural scaling variable for corporate taxes since it reflects changes in the size of the corporate sector. Tax payments by NFCs averaged 4.6 percent of net assets during the first five years of the 1960s, and were even higher at the end of the 1950s. The tax-to-asset ratio has fallen by a factor of three during the last twenty-five years. For the five years ended 1985, it averaged 1.5 percent, and it fell below 1 percent in 1982. Taxes as a percent of assets fell by 1.4 percent between the 1961-65 and 1971-75 periods, and declined by as much again during the last ten years.

Corporate taxes have also become a substantially less important part of the federal budget. They accounted for 6.5 percent of revenues during the most recent five years. By comparison, corporate taxes were nearly three times as important, accounting for 18.7 percent of federal revenues, during the 1961-65 period. The rapid growth of federal revenues from other sources, particularly social insurance taxes, coupled with declining corporate taxes to explain the pronounced reduction in the corporate tax share during the last twenty-five years.

2. Declining Tax Rates vs. Declining Tax Base

The decline in corporate taxes can be divided into two components: a decline in the rate at which corporate profits are taxed, and a decline in corporate profits themselves. The first component is the average tax rate, which has attracted widespread attention in the tax policy debate of the last five years (see Joint Tax Committee (1984) or Spooner (1986) for example). Many analyses of the corporate tax focus exclusively on the average rate, however, and imply the misleading conclusion that its movements are the sole cause of recent reductions in corporate tax revenues. This section demonstrates that while average tax rates have in fact declined, changes in corporate profits, the base of the corporate income tax, are an equally-important factor in explaining the change in corporate taxes.

2.1 Effective Tax Rates and the Tax-to-Asset Ratio

The tax-to-asset ratio is the product of the average tax rate and the corporate profit rate:

$$(1) \quad \text{TAXES/ASSETS} = (\text{TAXES/PROFITS}) * (\text{PROFITS/ASSETS}).$$

PROFITS denote the real economic profits earned by corporate equity-holders,¹ TAXES/PROFITS is the average effective tax rate, and PROFITS/ASSETS defines the real economic profit rate. PROFITS excludes foreign source income of U.S. corporations, since our asset measure includes only domestic capital. A detailed description of our measure of economic profits is provided in the appendix.

Table 2 presents data on the tax-to-asset ratio, the average tax rate,

Table 2

The Average Tax Rate and Corporate Profitability, 1959-85

Year	Average Tax Rate	Corporate Profit Rate	Ratio of Taxes to NFC Net Assets
1959	0.50	9.55	4.74
1960	0.51	8.30	4.25
1961	0.48	8.79	4.22
1962	0.42	10.09	4.24
1963	0.44	10.70	4.65
1964	0.41	11.69	4.74
1965	0.38	13.55	5.17
1966	0.38	13.70	5.16
1967	0.38	11.52	4.38
1968	0.41	11.93	4.88
1969	0.43	10.17	4.42
1970	0.45	7.07	3.21
1971	0.41	7.94	3.29
1972	0.41	8.38	3.41
1973	0.43	8.67	3.69
1974	0.50	6.20	3.12
1975	0.42	5.95	2.53
1976	0.43	6.83	2.96
1977	0.38	7.98	3.04
1978	0.38	7.92	3.01
1979	0.40	6.59	2.66
1980	0.41	5.27	2.14
1981	0.36	4.62	1.68
1982	0.34	2.88	0.98
1983	0.32	4.40	1.39
1984	0.28	6.24	1.76
1985	0.24	6.40	1.51
Five-Year Averages:			
1961-65	0.42	10.96	4.60
1966-70	0.41	10.88	4.41
1971-75	0.44	7.43	3.21
1976-80	0.40	6.92	2.76
1981-85	0.31	4.91	1.47

Notes: The three columns correspond to TAXES/PROFITS, PROFITS/ASSETS, and TAXES/ASSETS as described in the text. The third column is the product of the first two. Data descriptions are provided in the appendix.

and the profit rate for each year since 1959, the year when some IRS data used in our calculations first became available. The data clearly indicate that both falling average tax rates and a decline in profitability have contributed to lower corporate taxes. The average effective tax rate is 41.8 percent during the 1960s, compared with 30.8 percent during the last five years, a decline of more than one quarter. Average tax rates declined throughout the 1970s, averaging 43.4 percent for the 1971-75 period and 40.1 percent for the 1976-80 period. The average effective tax rate for the 1981-1985 period was 9 percent lower than its value for the 1976-80 period. This decline is twice as large as the drop between the first and second halves of the 1970s.

The second column of Table 2 reports the economic profit rate on nonfinancial corporate capital. The profit rate trends down throughout our sample period, but drops particularly sharply in the 1980s. From an average of 10.9 percent during the 1960s, the profit rate fell to 7.2 percent during the 1970s and 4.9 percent during the last five years. In 1982, when corporate taxes reached their postwar low, the corporate profit rate was also at its lowest level (2.9 percent). Although profits accruing to equity holders have rebounded since then, averaging 6.3 percent in the last two years, they are still well below their level in the previous two decades.

This dramatic decline in corporate profits is an important source of lower corporate tax receipts. The last column of Table 2 shows that the tax-to-asset ratio at the beginning of the 1960s, for example, was 3.1 times

that at the beginning of the 1980s. The average effective tax rate was 1.35 times its level in recent years, while the profit rate was 2.2 times its recent value. Declining profitability is therefore substantially more important than changes in the average tax rate in accounting for the reduction in corporate taxes.

The relative importance of changes in tax rates and the tax base can be illustrated by calculating what corporate tax receipts in the early 1980s would have been if either of the average tax rate or the profit rate had remained at its earlier level while the other changed over time. Actual corporate tax receipts averaged 49.6 billion 1986 dollars in the 1981-1985 period. If the profitability of corporate assets had been the same as in the 1960s, tax receipts would have more than doubled to \$110.4 billion. Even setting the profit rate equal to its value for the 1976-80 period would have increased annual revenues by over \$20 billion, to \$72.5 billion. Fixing the average effective tax rate at its earlier level would also have raised taxes, though not by as much as the return to earlier profit levels. If the tax rate during the last five years had returned to its level in the early 1960s, taxes would have averaged \$68.4 billion per year. Replacing the actual tax rate with its average value for the late 1970s would raise tax receipts by \$13 billion to \$62.5 billion per year.

2.2 Interpreting the Average Tax Rate

Although our division of the tax-to-asset ratio into average tax rate and profit rate components may provide some insight into the source of declining tax revenues, the two components are not independent. The nature of the

corporate income tax makes the average tax rate critically dependent upon the level of corporate profits. For taxable firms, many corporate tax deductions, such as depreciation allowances and tax credits, may be claimed regardless of the level of profits. A one percent increase in profits therefore raises the firm's taxable corporate income by more than 1 percent, increasing the average tax rate.

An offsetting effect arises for non-taxable firms. For firms with negative taxable income and no capacity to carry losses back against prior taxes, current tax payments will be zero regardless of how negative their real economic income is. An increase in profitability will not affect their taxes. It will, however increase their economic profits, which enter the denominator of the average tax rate calculation for the entire corporate sector. These links between profitability and tax rates make it impossible to interpret changes in the average tax rate solely as the result of legislation.

A simple example can illustrate these points. Consider a firm that purchases a capital asset for \$1000 and is entitled to tax depreciation allowances of \$150 per year, while the asset's true economic depreciation is \$100 per year. If the firm uses no debt and has no other inputs to the production process, then its real economic profits are its receipts less \$100. If the economic profit rate is 7 percent, receipts will equal \$170 and the firm's taxable income will be \$20. Assuming a flat-rate corporate income tax with a 0.50 marginal rate, the firm pays \$10 in taxes for an average tax rate of $10/70 = .142$, and a tax-to-asset ratio of .01. Now consider what happens if the economic profit rate rises to 10 percent, bringing receipts to \$200. Taxable income rises to \$50, so taxes are \$25, the tax-to-asset ratio is .025,

with a 0.50 marginal rate, the firm pays \$10 in taxes for an average tax rate of $10/70 = .142$, and a tax-to-asset ratio of .01. Now consider what happens if the economic profit rate rises to 10 percent, bringing receipts to \$200. Taxable income rises to \$50, so taxes are \$25, the tax-to-asset ratio is .025, and the average tax rate is 0.25. Shocks to corporate profits therefore affect measured average tax rates, even when the tax system is held constant.

To illustrate how, if some firms have tax losses, increased profits can lower the average tax rate, we introduce a second firm. It owns assets identical to those of the first firm, which earns a 7 percent return, but it operates in a different market with a 3 percent profit rate. Its receipts are \$130, taxable income equals -\$20, and it pays no taxes. The aggregate tax rate, computed by adding together the taxes of both firms and dividing by the sum of their profits, is 19.2 percent ($25/130$). The aggregate profit rate is 6.5 percent ($130/2000$). Now consider what happens if the second firm's profit rate rises to 5 percent. Its taxable income is now exactly zero but it still pays no taxes, so the aggregate average tax rate is 16.7 percent ($25/150$), down from 19.2 percent. The aggregate profit rate rises to 7.5 percent, illustrating the possibility of a negative relationship between profitability and the aggregate average tax rate.

The sensitivity of average tax rates to economic conditions is only one of their many shortcomings as a measure of corporate tax burdens. It is well known (see Auerbach (1983) or Fullerton (1984)) that average tax rates may provide little information on the pattern of marginal tax incentives facing new investments. In addition, aggregate average tax rates may conceal important differences in tax burdens across different assets and different

by banks that invest in municipal debt, as part of the total tax burden. Likewise, many sources of true economic income are ignored, since certain accounting practices that misstate economic income are not corrected. This problem even applies to the National Income Accounts. An example of such a misstatement is the inappropriate timing of expenses under the completed contract accounting method. Accounting differences accentuate the problem of comparing average tax rates across industries.

3. Why Have Average Tax Rates Declined?

The last section demonstrated that declining profits and declining average tax rates are jointly responsible for the dramatic fall in corporate taxes. Despite numerous shortcomings, average tax rates do prove useful in analyzing changes in corporate tax revenues. They have also played an important part in the recent corporate tax reform debate. This section therefore extends our previous analysis by investigating the proximate causes of declining average tax rates. The source of recent changes in corporate profitability constitutes an unresolved puzzle which is beyond the scope of the current paper.²

3.1 Statutory Tax Rates versus Average Tax Rates

Movements in average tax rates may be traced to changes in capital recovery provisions, the increased prevalence of firms with tax losses, increased use of investment tax credits, and other factors. Each of these factors causes the average tax rate to differ from the statutory maximum rate,

as shown in Table 3. The first column in Table 3 shows the maximum statutory tax rate for each year from 1959 to 1985. The entries in the six middle columns describe how various factors have caused the average tax rate to differ from the statutory rate. Negative entries indicate factors that caused the average tax rate to be less than the statutory rate, while positive entries correspond to factors that increased the tax burden above the statutory rate. The average tax rate, TAXES/PROFITS, is reported in the last column. It is the sum of the maximum statutory tax rate plus the six adjustment factors in the middle columns. A detailed description of our methodology for decomposing the average tax rate is provided in the appendix.

The first source of differences between statutory and average tax rates is increasingly-generous capital recovery, as shown in the second column of Table 3. This term includes both the tax reduction from use of the investment tax credit, as well as that due to differences between tax depreciation and true economic depreciation. During the most recent five year period, capital recovery provisions accounted for a 22 percent differential between the statutory and the average tax rate. This is a substantial increase from the late 1970s, when these provisions explained a 9.5 percent difference between the two tax rates, or the 1960s, when these factors reduced the average tax rate by 8.9 percent. Because generous capital recovery provisions have been one of the popular villains behind the recent decline in corporate taxes, we shall return below to provide a more detailed breakdown of these effects.

The third column in Table 3 reports the effect of inflation on average tax rates. This column combines two separate influences. First, inflation leads to spurious inventory profits that raise corporate tax payments and the

Table 3

Causes of Changing Average Tax Rates, 1959-1985

Year	Statutory Rate	Capital Recovery	Other Inflation Effects	Tax Losses	Foreign Tax Effects	Progres- sivity	Other Factors	Average Tax Rate
1959	52.0	-3.1	-1.2	2.6	1.0	-3.4	1.7	49.7
1960	52.0	-4.2	-0.8	4.9	1.2	-3.4	1.5	51.1
1961	52.0	-4.4	-1.5	3.6	0.5	-3.8	1.7	48.0
1962	52.0	-9.5	-2.0	3.3	0.4	-3.6	1.4	42.1
1963	52.0	-9.3	-1.0	3.2	0.5	-3.5	1.7	43.5
1964	50.0	-9.2	-0.8	2.5	0.4	-3.7	1.3	40.5
1965	48.0	-8.6	-1.3	1.8	0.3	-3.2	1.1	38.2
1966	48.0	-8.5	-1.6	1.6	0.3	-3.2	1.0	37.7
1967	48.0	-9.5	-1.0	2.2	0.4	-3.3	1.3	38.0
1968	52.8	-9.6	-2.4	2.4	0.6	-3.9	1.0	40.9
1969	52.8	-10.0	-1.5	4.1	0.7	-4.2	1.5	43.4
1970	49.2	-9.7	-1.5	7.8	0.7	-3.2	2.1	45.4
1971	48.0	-8.5	-4.1	6.4	0.5	-2.9	2.1	41.5
1972	48.0	-10.5	-1.1	4.0	1.1	-2.9	2.0	40.6
1973	48.0	-11.1	1.5	3.1	1.8	-2.6	1.9	42.6
1974	48.0	-13.9	10.2	5.1	1.0	-2.1	1.9	50.2
1975	48.0	-8.0	-4.6	4.8	3.5	-2.9	1.7	42.4
1976	48.0	-7.9	0.9	3.6	-0.2	-2.6	1.6	43.4
1977	48.0	-8.3	-0.6	3.2	-1.2	-2.7	-0.3	38.2
1978	48.0	-8.5	0.3	3.0	-0.5	-3.1	-1.1	38.0
1979	46.0	-10.4	3.8	4.3	-0.9	-3.1	0.6	40.4
1980	46.0	-12.2	2.1	6.6	0.2	-3.3	1.3	40.6
1981	46.0	-17.3	-2.1	10.5	0.9	-2.5	0.9	36.4
1982	46.0	-26.3	-5.5	22.2	0.3	-3.8	1.2	34.2
1983	46.0	-21.8	-2.7	10.8	0.2	-3.7	2.9	31.7
1984	46.0	-21.2	-2.9	7.7	0.2	-3.7	2.1	28.2
1985	46.0	-24.2	-4.3	7.6	0.2	-3.7	1.9	23.6
Five-Year Averages:								
1961-65	50.8	-8.2	-1.3	2.9	0.4	-3.5	1.4	42.5
1966-70	50.2	-9.5	-1.6	3.6	0.5	-3.6	1.5	41.1
1971-75	48.0	-9.5	0.4	4.7	1.6	-2.7	1.9	43.5
1976-80	47.2	-9.5	1.3	4.1	-0.5	-3.0	0.4	40.1
1981-85	46.0	-22.1	-3.5	11.8	0.4	-3.5	1.8	30.8

Notes: A detailed description of these calculations is presented in the appendix. All entries for 1984 and 1985 are based on preliminary data and extrapolations. The average tax rate (column 8) equals the statutory rate (column 1) plus the adjustment factors in columns 2-7.

average tax rate. (Inflation's positive impact through a related channel, the failure to index depreciation allowances for inflation, is subsumed in the capital recovery term above). Inflation also exerts a countervailing effect on the average tax rate by reducing the real value of corporate debt, generating capital gains for equity holders. These gains are untaxed, so inflation raises economic income but does not affect taxes. The two effects roughly cancel, resulting in a small net effect of inflation on the average tax rate. Inflation raised the average tax rate by less than 1 percent during the 1970s, and it has reduced the average tax rate by 3.5 percent during the 1980s.

The fourth column in Table 3 indicates the impact of imperfect loss-offset provisions on the average tax rate. The principal effect of imperfect loss offset is to raise the average tax rate when firms experience losses, since firms with negative income cannot claim tax refunds. Tax receipts are therefore higher than they would be in a system with proportional taxation of economic income. This effect is somewhat attenuated by the availability of loss carrybacks and net operating loss carryforwards. Carrybacks allow some loss offset in the year when losses occur. Loss carryforwards, in contrast, reduce a firm's current tax liability as a result of previous losses.

Imperfect loss offset provisions may raise or lower the average tax rate, depending on whether net operating loss deductions exceed the value of losses not carried back. The entries in column four of Table 3 shows that throughout the 1959-1985 period imperfect loss offsets generated a substantial net increase in the average tax rate. For the most recent five years, the

provisions regarding losses increased the average tax rate by 11.8 percent.

This is much larger than the impact of losses in any previous period.

Imperfect loss offsets accounted for a 4.4 percent increase in the average tax rate in the 1970s, and a 3.2 percent increase during the 1960s. This result deserves emphasis: the increased incidence of tax losses during the 1980s has increased, not reduced, the average corporate tax rate.

The fifth column of Table 3 describes how foreign tax provisions affect the average tax rate. This term consists of two parts. The first measures the increase in taxes that would have resulted if foreign source income were taxable at the U.S. statutory rate, while the second reduces taxes by the amount of foreign tax credits claimed. If the statutory tax rates in all other countries equalled that in the United States and all firms could utilize foreign tax credits in full, then the net foreign tax effect in our table would equal zero. If foreign countries levied taxes at rates below the domestic rate, the foreign tax effect would be positive since the domestic taxes on foreign source income would exceed the foreign tax credit. In our data, the net effect of foreign tax provisions is a small increase in the average tax rate. This effect averages 0.4 percent in the last five years, compared with 0.45 percent during the 1970s and 1960s.

The sixth and seventh columns of Table 3 indicate the influence of two other factors, tax progressivity and an "other" category which includes post-tabulation revisions and miscellaneous tax credits, on the average tax rate. Neither factor has a large effect. Tax progressivity, which accounts for the fact that some corporate income is taxed at rates below the statutory maximum, lowers the average tax rate by roughly 3.5 percent with little variation over

time. The "other" category usually raises the average corporate tax rate, since the results of tax audits are included in this category and they outweigh the other tax credits.

Table 3 clearly suggests that the most important factor causing average tax rates to fall below the statutory rate are capital recovery provisions. For the last five years, capital recovery provisions depressed the average tax rate by 14 percent more than they did during the 1960s and by 13 percent more than during the late 1970s. We now consider a more detailed breakdown of changes in capital recovery provisions.

3.2 Changes in Capital Recovery Provisions

The capital recovery variable in Table 3 has two parts: one due to the capital consumption adjustment, and the other due to the investment tax credit. The capital consumption adjustment is the difference between tax depreciation and real economic depreciation. It has two components: Accelerated Depreciation, and Basis Misstatement. Accelerated Depreciation is the difference between tax depreciation and economic depreciation at historic cost. Tax depreciation is based on tax service lives and depreciation schedules. It usually provides larger depreciation allowances than would application of realistic economic lifetimes and decay patterns to the historic costs of corporate assets. Taxable income therefore understates economic income, reducing the average tax rate. The second term, Basis Misstatement, measures the difference between straight-line depreciation using economic asset lives but historic asset costs and that using the same decay profiles but revaluing assets each year to their current replacement cost. Failure to

index the basis of depreciable assets raises taxable income above economic income and therefore increases the average tax rate.

The data in Table 4 show the relative importance of the three parts of the capital recovery aggregate. During the last five years, accelerated depreciation reduced the average tax rate by 35 percent, the ITC lowered it 13 percent, and inflationary misstatement of asset basis raised it by 26 percent. These large offsetting effects correspond to the net effect of -22 percent that is reported in the third column of Table 3. All three factors have become larger in absolute value during our sample period. In the 1960s, for example, accelerated depreciation lowered the average rate by 11.9 percent, inflation effects raised it by 5.4 percent, and the ITC lowered it by another 2.3 percent.

These results naturally raise the question of whether movements in the capital recovery factor are primarily the result of legislative changes, or whether they have been caused by other forces such as a shift in the composition of investment toward equipment rather than structures. Although separating average tax rate movements into components due to legislative and other changes is a treacherous exercise, some illustrative calculations are nonetheless possible. Ziemer (1985) estimates the change in federal corporate tax revenues due to the passage of ERTA and TEFRA, and presents a separate calculation for the impact of accelerated depreciation and other provisions. Using his revenue estimates, we calculate that the average tax rate would have been about 7 percent higher during the last four years if ACRS had not been adopted. This corresponds to increased revenues of \$20 billion per year, on average, since 1982. The effect would have been largest in 1985, the year

Table 4

Breakdown of Capital Recovery Components in Average Tax Rate

Year	Total Effect	Percentage Point Change in Average Tax Rate From:		
		Accelerated Depreciation	Inflation-Induced Misstatement of Tax Basis	Investment Tax Credit
1959	-3.1	-10.8	7.7	0.0
1960	-4.2	-12.6	8.3	0.0
1961	-4.4	-11.5	7.1	0.0
1962	-9.5	-12.7	5.7	-2.4
1963	-9.3	-12.2	5.0	-2.2
1964	-9.2	-11.1	4.2	-2.3
1965	-8.6	-9.5	3.5	-2.5
1966	-8.5	-9.3	3.5	-2.7
1967	-9.5	-10.9	4.3	-3.0
1968	-9.6	-11.6	5.1	-3.1
1969	-10.0	-13.5	6.2	-2.6
1970	-9.7	-17.0	8.8	-1.6
1971	-8.5	-14.5	8.5	-2.4
1972	-10.5	-15.0	8.5	-4.0
1973	-11.1	-14.8	8.1	-4.4
1974	-13.9	-21.6	13.4	-5.7
1975	-8.0	-17.6	17.3	-7.7
1976	-7.9	-15.2	16.0	-8.8
1977	-8.3	-14.4	14.2	-8.2
1978	-8.5	-14.7	14.6	-8.4
1979	-10.4	-17.6	17.2	-10.0
1980	-12.2	-22.6	21.7	-11.3
1981	-17.3	-30.0	26.8	-14.0
1982	-26.3	-50.2	43.3	-19.3
1983	-21.8	-36.9	26.3	-11.2
1984	-21.2	-29.0	17.1	-9.3
1985	-24.2	-28.6	15.0	-10.6
Five-Year Averages:				
1961-1965	-8.2	-11.4	5.1	-1.9
1966-1970	-9.5	-12.5	5.6	-2.6
1971-1975	-10.4	-16.7	11.2	-4.9
1976-1980	-9.5	-16.9	16.7	-9.3
1981-1985	-22.1	-34.9	25.7	12.9

Notes: Data used to construct this table are drawn from the National Income Accounts, Table 8.7, and from the IRS Statistics of Income Sourcebook. Entries for 1984 and 1985 are based on preliminary or extrapolated data series. See the appendix for further details.

with the largest stock of assets receiving generous ACRS depreciation.

Although ACRS has lowered corporate taxes in the past four years, focusing only on the immediate post-enactment effects of tax legislation can be misleading. Passage of a bill such as the Economic Recovery Tax Act depresses corporate taxes by more in the period immediately after enactment than it does in the steady state. Immediately after enactment, revenues are reduced both because new assets are given substantial depreciation benefits immediately after installation, and because some relatively old pre-reform assets are still eligible for depreciation benefits under the prior, less generous depreciation rules. In the steady state, only the generous depreciation for new assets reduces revenues. This partially explains why, even without the 1986 Tax Reform Act, corporate tax revenues were expected to rise during the late 1980s. An opposite effect arises with the recent legislation, which lengthens asset lives. It will collect more revenue in the short run than in the steady state, because some aging pre-TRA assets are paying higher taxes than they would had they been depreciated under the new rules.⁴

4. Corporate Taxes Under the 1986 Tax Reform Act

The recently enacted Tax Reform Act of 1986 shifts \$120 billion of federal tax liability from households to corporations over the 1987-1991 period. The TRA will therefore affect both the average tax rate and the tax-to-asset ratio for nonfinancial corporations. This section uses revenue projections from the Congressional Budget Office (1986) to estimate the course

of average tax rates over the next five years. It compares the tax trajectory without the Tax Reform Act with the trajectory under the new legislation, and places the increased corporate tax burden in historical perspective.

Table 5 compares the paths of corporate tax payments under old law and the Tax Reform Act of 1986. A detailed description of the calculations is provided in the appendix. The first panel shows the level of corporate tax payments by NFCs in 1986 dollars under the two regimes. Even under old law, corporate taxes are projected to rise. By 1990, for example, they will be 77 percent higher than in the first five years of the 1980s. Rising corporate tax payments can be traced to two sources. First, corporate profits are forecast to rise in the late 1980s. Our CBO-based projections imply a profit rate of 8.2 percent for the period 1987-1991, compared with 4.9 percent in the early 1980s. In addition, the front-loading of depreciation under ACRS implies that the average tax rate on projects undertaken since 1981 is low early in the project's life and high later on. As more projects reach the high-tax stage of their life cycle, corporate taxes also rise.

Under the Tax Reform Act, revenues rise even more rapidly than under old law. By 1990 corporate taxes from the NFCs exceed \$100 billion (1986 dollars), more than double the level of the past five years. For the 1987-1991 period, corporate taxes are 22 percent greater under the TRA than under current law. The new bill's revenue impact is largest in 1987, when it raises over 30 percent more revenue than the current law. This is because rates remain high, but most tax preferences have been eliminated.

The two lower panels of Table 5 show corporate taxes relative to GNP and corporate assets. Under current law the tax-to-GNP ratio would rise from

Table 5
Projected Corporate Tax Revenues, 1986-1991

NFC Federal Tax Payments (\$1986 billion)		
<u>Year</u>	<u>Old Law</u>	<u>New Law</u>
1986	56.0	61.5
1987	69.9	90.9
1988	79.2	96.9
1989	83.6	99.4
1990	87.7	103.6
1991	90.3	107.8

NFC Federal Taxes as Percent of GNP		
<u>Year</u>	<u>Old Law</u>	<u>New Law</u>
1986	1.3	1.5
1987	1.6	2.1
1988	1.8	2.2
1989	1.8	2.1
1990	1.8	2.2
1991	1.8	2.2

NFC Federal Taxes as Percent of Net NFC Assets		
<u>Year</u>	<u>Old Law</u>	<u>New Law</u>
1986	1.7	1.9
1987	2.1	2.7
1988	2.3	2.9
1989	2.4	2.9
1990	2.5	3.0
1991	2.6	3.1

Notes: Data entries correspond to calendar years and were constructed using Congressional Budget Office (1986) forecasts of corporate taxes and GNP under the old law, augmented by Joint Tax Committee estimates of the revenue effects of the Tax Reform Act of 1986.

1.2 percent in 1985 to 1.8 percent in 1991, while the Tax Reform Act raises this ratio to 2.2 percent. The new law therefore returns the tax-to-GNP ratio to its level during the late 1970s, but not to the level (3.2 percent on average) of the 1960s. A similar statement applies to the ratio of tax payments to net NFC assets, which is plotted in Figure 1. From an average of 1.5 percent in the 1981-85 period, this tax measure rises to 2.6 percent under old law and to 3.1 percent under new law by 1991. The new law will double the ratio of taxes to corporate assets, although this ratio will still be lower than it was during the 1960s.

Although part of the change in tax revenues is due to anticipated increases in corporate profits, the average tax rate will also change significantly during the next five years. This is shown in the first two rows of Table 6, which report the average tax rates under old law and under the Tax Reform Act for the 1986-1991 period. Without any legislative change, the average tax rate would have increased from 0.24 in 1985 to 0.30 by 1990. This is higher than in the first five years of the 1980s, but still below the level of the late 1970s. Under new law, by comparison, the average tax rate rises to 0.36 by the end of the decade, almost returning to its level of the late 1970s. The Tax Reform Act has its largest impact on the tax rate in the transition period, 1987 and 1988, when the ratio of taxes to economic profits rises by 8.1 percent and 6.5 percent, respectively. Figure 2 plots the movements in average tax rates both for the 1959-1985 period as well as for the next five years under both old and new law.

The Tax Reform Act of 1986 changes numerous provisions in the corporate income tax. The Joint Tax Committee's revenue estimates, for example, include

TAX-TO-ASSET RATIO, 1959-1991

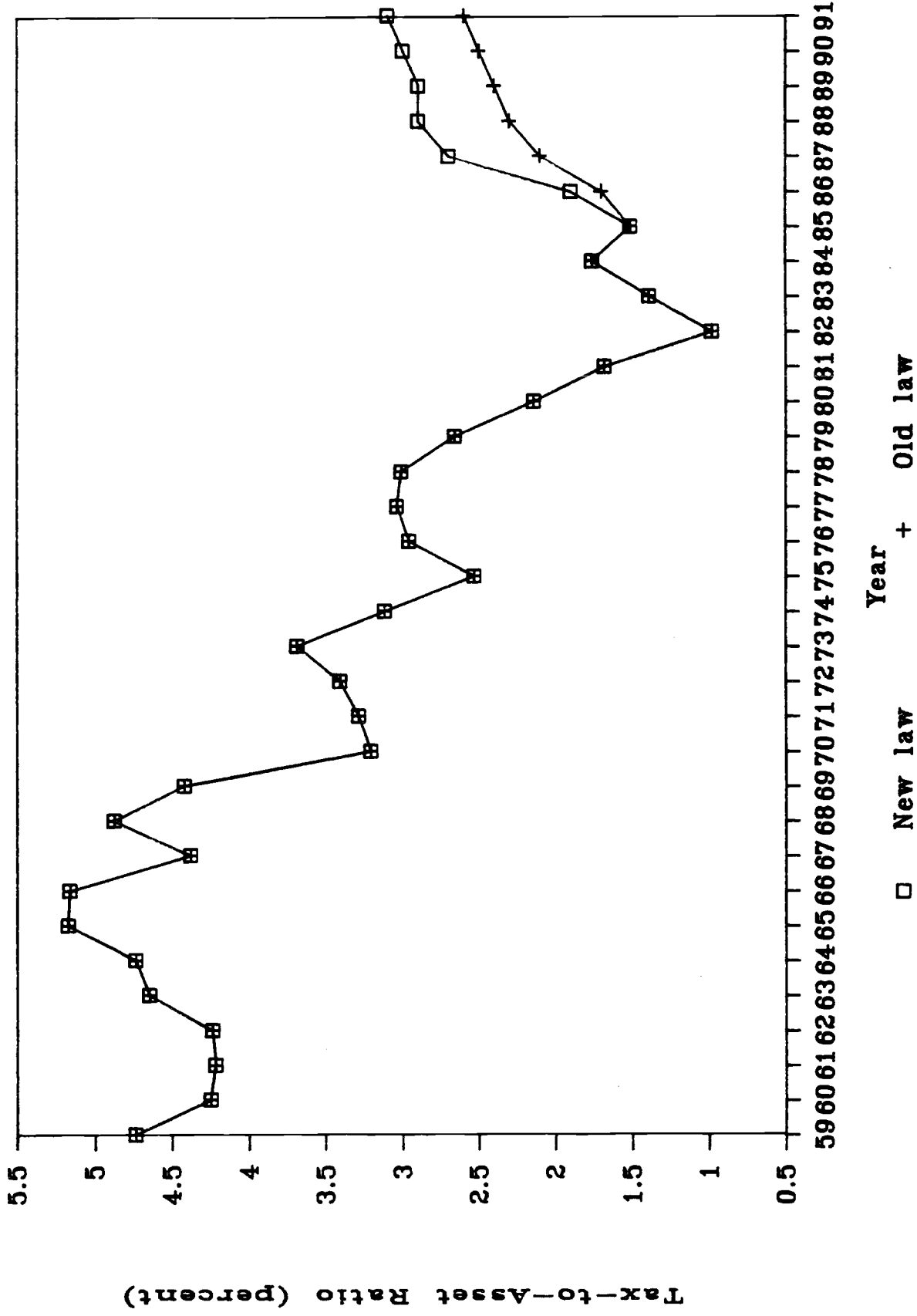


Figure 1

Table 6
Projected Average Tax Rates, 1986-1991

	Year					
	1986	1987	1988	1989	1990	1991
Average Tax Rate (Old Law)	22.9	26.8	29.0	29.7	30.2	29.9
Average Tax Rate (New Law)	25.1	34.9	35.5	35.3	35.7	35.7
Tax Rate Differential New Law - Old Law	2.2	8.1	6.5	5.6	5.5	5.8
Differential Due to:						
- Statutory Rate	0.0	-6.0	-12.0	-12.0	-12.0	-12.0
- Capital Recovery	1.5	5.6	6.5	8.4	9.6	11.0
- Accounting Rules	1.0	4.1	4.9	4.3	3.5	2.4
- Other Factors	-0.3	4.4	7.1	4.9	4.4	4.4

Notes: Calculations are based on CBO (1986) projections of corporate profits and tax revenues under pre-1986 law, combined with Joint Tax Committee forecasts of revenue changes from the Tax Reform Act of 1986.

AVERAGE TAX RATE, 1959-1991

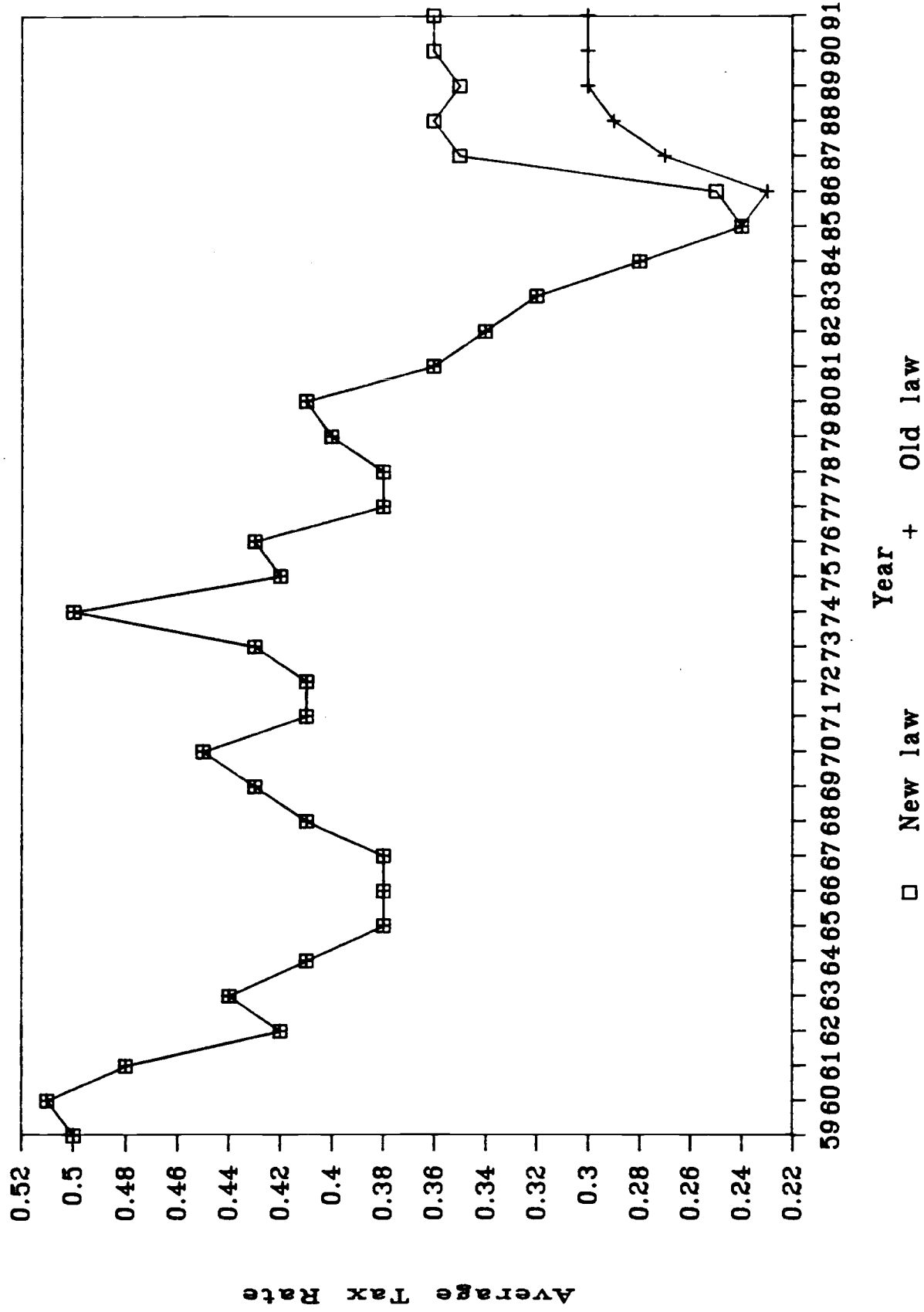


Figure 2

seventeen major categories, and hundreds of minor categories, through which revenue changes occur. A detailed analysis of why the average tax rate will differ from the statutory rate is impossible because many of the required data series are unavailable. We can, however, provide a rough sketch of why the average tax rate changes under the new law.

The last four rows in Table 6 disaggregate changes in the effective tax rate between old law and the Tax Reform Act into four categories. The first, the change in the statutory rate, reduces the average rate. There are no rate changes for 1986. In 1987, the statutory rate falls by 6 percent to the 40 percent "blended" rate for a company whose fiscal year coincides with the calendar year. Beginning in calendar 1988, the top statutory rate is 34 percent.

Several provisions offset the statutory rate reduction and raise the average tax rate. The next row shows the impact of changes in capital recovery provisions, principally the repeal of the Investment Tax Credit and the extension of tax depreciation lives. This accounts for an 11 percent increase in the average tax rate in 1991. In the earlier years it is somewhat less important, principally because transition rules allow a substantial share of the investment undertaken prior to 1988 to obtain favorable tax treatment.⁵

The penultimate row in Table 6 shows how changes in accounting rules affect the average tax rate. There are a number of important provisions in this category, including changes affecting long-term contracts, the capitalization of construction and development costs, and the treatment of capital gains on installment obligations. These accounting changes raise the

average tax rate by nearly 5 percent in 1988, and by an average of 3.8 percent during the 1987-1991 period.⁶ The final row of Table 6 shows how various other factors cause the average tax rate under the new law to differ from that under previous law. These provisions include the strengthened minimum tax, changes in foreign tax credit provisions, and revenues from increased tax compliance. These miscellaneous provisions increase the average tax rate by 4.4 percent in 1991.

Although our calculations of the factors behind changes in average tax rates are necessarily uncertain, they do underscore two important features of the 1986 Tax Reform Act. First, changes in capital recovery provisions will significantly raise corporate taxes. By the late 1980s, the differential between the statutory and the average tax rate that will be attributable to capital recovery rules will return to its level in the 1960s and 1970s. The Tax Reform Act therefore reverses the changes of the early 1980s, when the combination of accelerated depreciation and investment credits lowered average tax rates by as much as 25 percent. Second, many of the important revenue-raising provisions in the new law are excluded from the usual economic analysis of corporate tax incentives. Marginal effective tax rate calculations, such as those in King and Fullerton (1984), do not usually incorporate particular accounting rules, minimum taxes, or many of the other provisions that have an important effect on corporate investment incentives.

5. Conclusions

This paper explores why corporate tax revenues have declined for the last thirty years. Contrary to many claims, legislative changes explain less than half of the decline in revenues since the mid-1960s. The decline in corporate profits, which averaged nearly 11 percent of the value of net corporate assets during the 1960s as compared with just under 5 percent in the 1980s, is a more important factor.

Declining corporate tax revenues have been accompanied by a decline in the average tax rate, the ratio of corporate taxes to economic profits. While this average tax rate is of limited value for analyzing the incentive effects of the corporate tax, it has attracted widespread attention in the recent tax reform discussion. Changes in both the tax law and the rate of corporate profits affect the average tax rate. The change in depreciation provisions between the late 1970s and the early 1980s reduced the average tax rate by roughly 13 percent.

The Tax Reform Act of 1986, which raises \$120 billion in corporate taxes over the next five years, accelerates the trend toward rising average tax rates that would have occurred under old law. Reduced capital recovery allowances and other changes in the 1986 Act will combine to raise average effective tax rates to 36 percent by 1990, compared with 31 percent in the first five years of the 1980s. Corporate taxes as a share of GNP and relative to corporate assets will also rise significantly. By 1990, federal tax payments will equal 3 percent of net corporate assets, well above their level in the early 1980s and approximately equal to their asset share in the late

1970s. Taxes will still remain a smaller fraction of assets than they were in the 1960s, however, in part because corporate profitability is projected to be well below its level two decades ago. Although we focus on the Tax Reform Act's revenue impact over the next five years, this is a potentially misleading indicator of a tax bill's revenue effects. By lengthening the depreciation lives of many assets, the new law raises corporate tax revenues in the short run at the expense of some reduction in future years. The inherent uncertainty in long-range forecasts, however, makes it difficult to quantify these effects.

Much of our analysis implicitly divorces the average tax rate from the corporate profit rate, although such a separation is in fact impossible. Because corporate taxes do not rise proportionally with corporate profits, changes in the profit rate have a direct influence on the average tax rate. Over longer horizons, the average tax rate may also affect the profit rate, at least if average and marginal tax rates move in tandem. Higher tax burdens will induce offsetting reductions in capital investment which should increase pretax profitability.

Finally, our analysis of revenue changes in the 1986 Tax Reform Act suggests that a wide range of corporate tax provisions which have important revenue effects are typically ignored in the economic analysis of the corporate income tax. These provisions affect both the average and marginal tax rates on new investment, and deserve to be incorporated in future work.

Footnotes

1. Alternative views of what constitutes the corporate tax base are also possible. Feldstein and Summers (1979) and Feldstein, Dicks-Mireaux, and Poterba (1983) consider the total earnings of the corporate sector, including those paid to debt-holders, as the tax base. Because interest payments are taxed less heavily than equity earnings, measuring the average tax rate relative to this base would lower the average tax rate but not affect its decline over time. The profit rate associated with this concept of corporate profits has also declined significantly during our sample period.

2. Since we are concerned primarily with the impact of legislative changes on tax receipts, we focus on the role of tax reforms in altering the average tax rate. Although tax changes may also affect revenues by altering profits, this effect is likely to be small over the time horizons we consider.

3. Our calculations may overstate the importance of capital recovery provisions in lowering the average tax rate, because we assume that all changes in the difference between tax and economic depreciation were actually claimed by firms. For firms which are carrying losses forward, this will overstate the importance of depreciation provisions, and overstate the importance of losses as well.

4. Although revenues will be lower immediately after a tax reform like ERTA than in the steady state, it does not follow that tax revenues two years after the reform are higher than those in the year after the reform. There is a countervailing revenue-reducing effect: as the stock of assets being depreciated under the generous new rules rises, tax receipts may decline.

5. Our measure of the average tax rate change due to capital recovery may understate the actual impact of the new law because of the interaction between depreciation provisions and the strengthened minimum tax. For firms with substantial depreciation deductions, the new minimum tax may raise tax payments. This is classified as an effect of the minimum tax, not depreciation rules, in our analysis.

6. An important caveat applies to the accounting-induced change in average tax rates. Table 6 reports the accounting-induced change in taxes divided by our measure of economic income. Each accounting change, however, also affects the measured value of economic income. Repeal of the completed contract method of accounting, for example, will change the IRS measure of receipts less deductions that forms the basis for our profits variable. Average tax rates computed relative to measured economic income under the new tax regime, therefore, would be slightly lower than those reported here since income will be higher as a result of these accounting changes. Average tax rates in all previous years, computed relative to an economic income measure which did not allow for deferred accrual under the completed contract method, would be lower than those reported in Tables 2 and 3. The change in average rates over time is not affected by the choice of convention for economic income, even though the level of the average rate is.

References

- Altshuler, Rosanne and Alan J. Auerbach. 1986. "The Significance of Tax Law Asymmetries: An Empirical Investigation." Philadelphia: University of Pennsylvania, Department of Economics, mimeo.
- Auerbach, Alan J. 1983. "Corporate Taxation in the United States," Brookings Papers on Economic Activity 2: 451-513.
- Board of Governors of the Federal Reserve System. 1986. Balance Sheets of the U.S. Economy. Washington: Board of Governors.
- Congressional Budget Office. 1985. Revising the Corporate Income Tax. Washington: U.S. Government Printing Office.
- Congressional Budget Office. 1986. The Economic and Budget Outlook: An Update. Washington: U.S. Government Printing Office.
- Feldstein, Martin S., Louis Dicks-Mireaux, and James Poterba. 1983. "The Effective Tax Rate and the Pretax Rate of Return." Journal of Public Economics 21 (July): 129-158.
- Feldstein, Martin S. and Joosung Jun. 1986. "The Market Value of Corporate Debt and the Changing Debt-Capital Ratio." Forthcoming.
- Feldstein, Martin S. and Lawrence H. Summers. 1979. "Inflation and the Taxation of Capital in the Corporate Sector." National Tax Journal 32 (December): 445-470.
- Fullerton, Don. 1984. "Which Effective Tax Rate?" National Tax Journal 37: 23-41.
- Joint Committee on Taxation. 1984. Study of 1983 Effective Tax Rates of Selected Large U.S. Corporations. Washington: U.S. Government Printing Office.
- King, Mervyn A. and Don Fullerton. 1984. The Taxation of Income From Capital. Chicago: University of Chicago Press.
- McIntyre, Robert S. 1984. Corporate Income Taxes in the Reagan Years: A Study of Three Years of Legalized Tax Avoidance. Washington: Citizens for Tax Justice.
- Neubig, Thomas and C. Eugene Steuerle. 1983. "The Taxation of Income Flowing Through Financial Institutions: General Framework and a Summary of Tax Issues." Working Paper #52, Office of Tax Analysis, U.S. Treasury Department.
- Spooner, Gillian. 1986. "Effective Tax Rates from Financial Statements." National Tax Journal 39: 293-306.

- States, William. 1984. "Corporate Foreign Tax Credit 1980: An Industry Focus." Statistics of Income Bulletin 4: 63-84.
- U.S. Department of Commerce, Bureau of Economic Analysis. 1985. Corporate Profits Before Tax, Profits Liability, and Dividends. BEA Methodology Paper MP-2. Washington: U.S. Government Printing Office.
- U.S. Department of the Treasury. 1985. Internal Revenue Service. Statistics of Income: Corporation Income Tax Returns, 1982. Washington: U.S. Government Printing Office.
- U.S. House of Representatives. 1986. Tax Reform Act of 1986: Conference Report to Accompany H.R. 3838. Report 99-841. Washington: U.S. Government Printing Office.
- Ziemer, Richard C. 1985. "Impact of Recent Tax Law Changes." Survey of Current Business 65 (April): 28-31.

Technical Appendix

Description of the Average Tax Rate Decomposition and Data Sources

This appendix explains how we allocate changes in the average tax rate into various components, describes our measures of tax payments and economic income for nonfinancial corporations, and presents a detailed account of our post-1986 projections.

The Average Tax Rate Decomposition

Our average tax rate decomposition begins from the definition of federal tax receipts from the NFCs:

$$(A1) \quad \text{TAXES} = \tau * \lambda * \text{ISTT} - \text{CBACKS} - \text{ITC} - \text{FTC} - \text{OTHCREC} + \text{RETAB}.$$

ISTT denotes income subject to tax, τ is the maximum statutory corporate tax rate, and λ is a "progressivity parameter" reflecting the fact that not all taxable income is taxed at the top marginal rate. All the terms on the right-hand side of (A1) are directly available, except for λ . We estimate λ using data from the Statistics of Income Sourcebook as $\lambda = \text{TAXBEFCRED} / (\tau * \text{ISTT})$, where TAXBEFCRED is taxes payable before computation of credits. Investment tax credits (ITC), foreign tax credits (FTC), other credits (OTHCREC), and CBACKS (loss carrybacks) reduce corporate tax receipts. RETAB, which corresponds to the results of IRS audits and other changes in prior returns, is typically positive and therefore raises revenue. Note that our measures of tax credits correspond to actual, not potential, credits; limits on the use of tax credits may induce substantial differences between the two in recent years (see Altshuler and Auerbach (1986) for a discussion).

While taxes are levied on income subject to tax, average tax rates are calculated relative to the real economic income of shareholders, denoted by PROFITS. Income subject to tax and economic income are related by the identity:

$$(A2) \quad \text{PROFITS} = \text{ISTT} + \text{NTI} + \text{NOL} + \text{CCADJ} + \text{IVA} + \text{DEBTGAIN} - \text{FSI}$$

where NTI is the net income of firms with current losses and zero taxable income, NOL is the statutory deduction for net operating losses incurred in previous years, CCADJ is the National Income Accounts capital consumption adjustment that is the difference between tax and economic depreciation, IVA is the inventory valuation adjustment (again from NIPA) that measures the spurious profits which result from inflation on goods in inventory, DEBTGAIN is the transfer from bondholders to equity-holders that takes place when inflation reduces the value of outstanding debt, and FSI is the foreign source income of U.S. corporations. A very helpful reference for understanding the relationship between IRS and National Income Accounts measures of corporate profits is the U.S. Department of Commerce (1985).

Equations (A1) and (A2) can be combined to obtain an expression for tax receipts in terms of economic income. Dividing through this expression by economic income yields:

$$(A3) \quad \text{TAXES/PROFITS} = \tau^* \lambda - \tau^* \lambda * (\text{NTI} + \text{NOL} + \text{CCADJ} + \text{IVA} + \text{DEBTGAIN} - \text{FSI}) / \text{PROFITS} \\ - (\text{ITC} + \text{FTC} + \text{OTHCREC} + \text{CBACKS}) / \text{PROFITS} + \text{RETAB/PROFITS}.$$

We rewrite this expression by grouping together related terms:

$$\begin{aligned} (A4) \text{ TAXES/PROFITS} = & \tau - (\tau\lambda\text{CCADJ} + \text{ITC})/\text{PROFITS} - \tau\lambda(\text{IVA} + \text{DEBTGAIN})/\text{PROFITS} \\ & - (\tau\lambda[\text{NOL} + \text{NTI}] + \text{CBACKS})/\text{PROFITS} - (\text{FTC} - \tau\lambda\text{FSI})/\text{PROFITS} \\ & + \tau(\lambda - 1) - (\text{OTHCREC} + \text{RETAB})/\text{PROFITS}. \end{aligned}$$

The first term on the right-hand side of (A4) is the maximum statutory tax rate. The six adjustments to the statutory rate that are required to obtain the average tax rate correspond to the entries in Table 3.

The first adjustment involves capital recovery provisions. It is the sum of investment tax credits and CCADJ, the difference between tax depreciation and economic depreciation of corporate assets at replacement cost. The National Income Accounts also disaggregate the CCADJ into the components due to accelerated depreciation at historic cost and inflationary misstatement of basis; this breakdown is used in our Table 4.

The next adjustment term corresponds to the other distortions of profits related to inflation. It includes the inventory valuation adjustment and the inflation-induced gain on corporate debt. NIPA convention defines IVA as a negative quantity; the average tax rate is therefore increasing in the IVA, which in turn is an increasing function of inflation. DEBTGAIN is positive, however, and reduces the average tax rate during periods of high inflation. This is because the inflation-induced gains of the equity holders are not part of the tax base, so they yield income but no tax liability. The net effect of these two factors depends upon the level of leverage and the stock of inventories held in the corporate sector.

The third adjustment term concerns corporate losses, and consists of three parts. The first is the net income of firms with zero taxable income,

the second adds net operating loss deductions back into taxable income, and the third adjusts for the use of current losses to obtain carryback refunds. Again there are countervailing effects. Higher levels of both NOL deductions and carryback refunds reduce the average corporate tax rate relative to what it would be in a system which taxed current economic income. Increases in the losses accruing to currently non-taxable firms, however, raise the average tax rate. (NTI is a negative number, so that an "increase in losses" is in fact a reduction of NTI, although an increase in its absolute value.) Losses raise the average tax rate because economic income is computed by netting the income of firms with positive profits against the income of firms with losses. For tax purposes, however, this offset does not take place. Firms with positive profits pay taxes while those with negative earnings receive nothing. Imperfect loss offset provisions therefore cause losses to raise the average tax rate.

The fourth adjustment to the statutory rate involves foreign income and tax credits. The adjustment term equals the tax liability that would have been due on foreign source income if it had been earned in the United States, minus foreign tax credits claimed. Since foreign tax credits are subject to a variety of limitations, the net effect of these two factors is usually to raise average tax rates. Our treatment of foreign source income also induces a potential relationship between foreign tax rates and the measured average tax rate on domestic income. For example, income earned in a country with a corporate tax rate below $\lambda^*\tau$ will face additional tax when repatriated to a U.S. firm. This will raise our measured average tax rate on domestic income. Such effects are inevitable in any calculation such as ours that considers the

domestic tax rate in one nation rather than the worldwide tax rate on worldwide income.

The two remaining adjustments are straightforward. The fifth, for the progressivity of the tax code, measures the change in the average tax rate due to taxing some positive-income firms at rates below the statutory maximum. It always reduces the average tax rate, since about 10% of the positive taxable income accruing to corporations is taxed at rates below the statutory maximum. The final term combines other tax credits with retabulations. Other tax credits are important primarily in recent years, when they include the R&D Tax Credit, the New Jobs Credit, and various energy-related credits. Retabulations consist primarily of audit profits and minor adjustments to tax returns filed in previous years.

Data Sources

Most of the data series used in our analysis are drawn from either the National Income and Product Accounts, supplemented by unpublished NIPA data, or the IRS Corporation Sourcebook of Statistics of Income. In some cases the data series for 1984 and 1985 are based on preliminary data or have been constructed by extrapolating 1983 values.

The National Income and Product Accounts present data on federal corporate profits tax liability for the entire corporate sector, but not for the NFCs. (NIPA also presents total tax liabilities to all governments, divided into financial and nonfinancial sectors). We construct our own estimate of NFC federal taxes following the NIPA approach for all corporations as in NIPA Table 8.13. Our tax measure is:

$$\begin{aligned} \text{(A5)} \quad \text{TAXES} &= \text{Income Taxes Before Credits (SOI)} - \text{Tax Credits (SOI)} \\ &\quad - \text{Carryback Refunds (NIPA)} + \text{Other Retabulations (NIPA)} \end{aligned}$$

The first two variables are drawn from Statistics of Income for the years 1959-1983. Our sample period begins in 1959 because that is when the IRS began publishing information on Income Subject to Tax, one of the variables used in constructing corporate profits. We construct a measure for the nonfinancial corporate sector as All Returns - Finance Insurance and Real Estate + Insurance Agents + Real Estate Operators. This is not exactly coincident with the NIPA definition, which also includes some holding companies that cannot be separately identified from the SOI data, but the differences between the two series are trivial. Carrybacks and other retabulations are drawn from unpublished data used to construct NIPA Table 8.13. Our data on these series are for the entire corporate sector, because a breakdown for financial versus nonfinancial firms is not available. The errors associated with the inclusion of financial firms in these aggregates are also likely to be small.

For 1984 and 1985 our measures of tax credits are based on forecasts provided by the Joint Tax Committee. We extrapolated Income Taxes Before Credits by extrapolating total taxes, using NIPA data on NFC tax liability to all levels of government, and then adjusting it for the credit terms on the right-hand side. We obtained data on the sum of carrybacks and retabulations from the preliminary National Income and Product Accounts, and assumed carrybacks remained constant at their 1983 level to divide the series into its two components.

We define real economic profits of the nonfinancial corporate sector as:

$$\begin{aligned} \text{(A6) PROFITS} &= \text{Income Subject to Tax (SOI)} + \text{Net Operating Loss Deductions (SOI)} \\ &+ \text{Negative Taxable Income (SOI)} + \text{CCADJ (NIPA)} + \text{IVA (NIPA)} \\ &+ \text{DEBTGAIN} - \text{FSI} \end{aligned}$$

The data series for Income Subject to Tax and NOL Deductions are drawn from Statistics of Income. IVA is reported in the NIPA, in Table 1.16. The measurement of NTI, CCADJ, DEBTGAIN, and FSI require discussion.

NTI is the net income of firms with zero taxable income. It is computed as the difference between the entries for Net Income in the Sourcebook tables for (i) Firms With and Without Net Income, and (ii) Firms With Net Income. NTI is this difference minus the net income differential for Subchapter S corporations and the Special Statutory Deductions for firms with no taxable income.

Although a measure of CCADJ is reported in the National Income Accounts, we amend it slightly for our analysis. We augment the NIPA measure of CCADJ (Table 8.4) with the depletion adjustment for domestic minerals and the adjustment to depreciate expenditures for oil shafts, wells, and exploration from NIPA Table 8.12. These are additional cases in which tax depreciation differs from economic depreciation, so these terms must be added to the accelerated depreciation component of CCADJ.

DEBTGAIN is defined as the fourth quarter-to-fourth quarter percentage change in the GNP deflator, times the market value of outstanding NFC debt at the end of the previous year. The time series for debt at market value is described in Feldstein and Jung (1986).

FSI is measured as foreign service taxable income less loss (before

recapture) as reported in various issues of the Statistics of Income Bulletin. This corresponds to current taxable income from foreign sources. Unfortunately, this data series is not available for every year since 1959; rather, it is available for 14 of the years between 1961 and 1982. We interpolated and extrapolated these data to other years when necessary. In 1979, the dramatic decline in the net foreign tax effect on the average tax rate may be due to some error induced by our interpolation procedure.

Our measure of economic profits differs from that in the National Income Accounts in several ways. The most important is its inclusion of the equity-holders capital gain on corporate debt during inflationary periods. In addition, the National Income Accounts include net foreign source equity income of all U.S. residents in the measured corporate profits. We also include the 15% of intercorporate dividends not exempt from taxation, because the data required to remove this component of IRS taxable income were not available prior to 1978.

All of the series based on NIPA data were available through 1985, with the exception of the depletion and oil exploration adjustments which were available through 1983. We constructed 1984 and 1985 values for these series as well as the NOL and NTI series from the IRS by assuming they remained constant at their real 1983 levels. We assumed λ remained constant at its 1983 value, and updated ISTT as $ISTT = TAXBEFCRED/\tau*\lambda$ using our TAXBEFCRED forecast.

Finally, we measured the current replacement cost of the net tangible assets held in the nonfinancial corporate sector using the Federal Reserve Board's Balance Sheets of the U.S.Economy. The Balance Sheets report year-end

values, which we averaged to construct the mid-year value for the denominator of our profit rate calculations. We subtract the Feldstein-Jun (1986) measure of the market value of corporate debt to obtain a series for the net assets of the corporate sector.

Revenue and Average Tax Rate Projections, 1986-1991

Most of our calculations for the 1986-1991 period rely on data from the Congressional Budget Office (1986). We use their GNP projections and inflation forecasts for the GNP deflator throughout our calculation.

Our profit variable, PROFITS, has two components. One corresponds loosely to real economic profits in the NIPA, the other is DEBTGAIN. To calculate the PROFITS components other than DEBTGAIN, we use the CBO forecast of real corporate profits on a NIPA basis, PROFITSNIPA. We compute the ratio $(\text{PROFITS} - \text{DEBTGAIN})/\text{PROFITSNIPA}$ for 1984 and 1985; the ratios are .747 and .703, respectively. Using an average ratio of .725, we forecast $(\text{PROFITS} - \text{DEBTGAIN})$ based on the CBO forecasts and then add in DEBTGAIN, calculated as the CBO inflation rate times our extrapolation of corporate debt (which is the 1985 value extrapolated at the nominal GNP growth rate).

We compute NFC tax liabilities under old law using the CBO's forecasts of fiscal year corporate tax receipts (p.63), less projected receipts from Federal Reserve Banks (taken from the OMB Federal Budget projections for Fiscal 1987 and years through 1989, with extrapolation through 1991 holding the series constant in real terms). This tax measure is a fiscal year indicator of accruals from the whole corporate sector. We use the ratio of NFC to total federal taxes in 1985 (.885) to scale this profit measure for the

NFCs, and then convert to calendar years by averaging adjacent fiscal years with weights of .75 and .25, respectively. When projections for FY 1992 were needed, we assumed that the fiscal 1991 value grew at the same rate as between FY 1990 and 1991.

Total federal revenues for fiscal years through 1991 are reported in the CBO (p.63). We calculated calendar year revenues as a weighted average, and found the calendar 1991 value by increasing the calendar 1990 value in the same proportion as the fiscal 1991 revenue forecast relative to the fiscal 1990 forecast. We extrapolated the net replacement value of NFC assets assuming they grew in real terms at 1.64% per year, the average growth rate for the years 1980 through 1985, and fully reflected inflation in the GNP deflator.

Finally, to measure the revenue changes associated with the 1986 Tax Reform Act, we rely upon the Joint Tax Committee's revenue estimates presented in House of Representatives (1986). We estimate the total tax effect for nonfinancial corporations as the total change in corporate revenues, less the changes due to taxation of insurance companies and financial institutions (titles IX and X of the revenue estimates), less .115 times the revenue changes for the minimum tax, pension provisions, compliance, and miscellaneous other provisions (titles VII, XI, XV, and XVII). This correction adjusts for the share of these revenue changes which arise from the financial corporations. We adjust all revenue estimates from fiscal to calendar years using weighted averages, and construct fiscal 1992 estimates assuming the fiscal 1991 value grows at the same rate as it did between fiscal 1990 and fiscal 1991. Our measure of capital recovery changes is just the revenue

change due to title II, capital cost provisions, and that for accounting reforms is the revenue estimate in title VIII.