Final Report

THE TAXATION OF SMALL CORPORATIONS

by

Richard L. Boyce and Charles R. Hulten

April, 1985

THE URBAN INSTITUTE

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Washington, D.C. 20037

Project Report
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'Relative Tax Burden by Firm Size and Industry'

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Introduction

Are small companies* taxed more lightly than their larger counterparts? The conventional answer is an unqualified 'yes!' Small companies have access to provisions in the Internal Revenue Code that are not available to large corporations: companies with taxable income less than $100,000 are taxed at lower statutory rates and many small corporations can elect to be taxed as partnerships under Subchapter S and thus avoid the corporate tax altogether. These and other preferences are reflected in data from the Internal Revenue Service (IRS), which indicate that average corporate tax burdens rise with size of corporation.

The apparent tax advantage enjoyed by small firms has been challenged by some tax reformers who see little justification for this preference. Both the 'Fair Tax' proposed by Senator Bill Bradley and Representative Richard Gephardt and the new Treasury tax proposal, Tax Reform for Fairness, Simplicity, and Economic Growth**, would remove apparent tax preferences by abolishing the graduated rate structure of the current corporate income tax. The rationale for this change, according to the Treasury, is:

'the current progressive rate structure for corporate income serves no affirmative purpose and encourages the use of corporations to gain the advantage of low marginal tax rates. The

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* This report examines the taxation of large and small corporations. The small business sector is, of course, much larger than small corporate business. It includes partnerships and sole proprietorships, whose tax treatment is beyond the scope of this study.

** Throughout this report, we will use the term Treasury tax proposal to mean the tax proposal put forward in November, 1984. This proposal is commonly referred to as 'Treasury I', since the announcement of a new administration proposal in May, 1985.
progressive rate structure for individuals is premised on the ability-to-pay concept, which in turn reflects an assumption that additional amounts of income are increasingly available for discretionary, nonessential consumption. These concepts have no relevance to corporate income, all of which is either distributed or used to produce additional income. Moreover, under current law a small corporation can escape high marginal tax rates on corporate income by electing pass-through treatment as an S corporation. (Vol. II, p. 128)

Implicit in this rationale is the assumption that the progressive statutory rate structure actually results in progressive effective tax rates.

This report examines the progressivity of the corporate income tax using the well-known Hall-Jorgenson model of effective tax rates. As it is usually applied, the Hall-Jorgenson model distinguishes between small and large corporations only insofar as statutory rates differ. The resulting marginal effective tax rates (METR) mirror the graduated statutory rate structure, and necessarily yield rising effective tax rates.

Since the conventional METR model cannot yield anything but rising effective tax rates, it is unsuitable for testing whether or not marginal effective tax rates are in fact progressive. We develop a generalization of this model which does allow for size-specific differences in: (1) interest rates and debt-equity ratios, (2) the after-tax return to capital, and (3) the relative importance of inventory investment. When the conventional model is extended to permit consideration of these differences and they are taken into account.

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*The Hall-Jorgenson marginal effective tax rate (METR) measures the effective tax burden on an additional dollar earned by a new investment. The METR concept has appeared in the Economic Report of the President, the Treasury tax proposal, numerous publications of the Congressional Budget Office and the Congressional Research Service, and in a large number of academic publications.*
account, effective corporate tax rates may no longer be progressive.

Even though our model is more general than the conventional approach, it is by no means perfectly general. We are therefore unable to say whether the corporate tax is actually regressive or progressive. Rather, our results should serve as a strong caution against policy changes formulated under the assumption that tax provisions that appear favorable to small business actually confer lighter tax burdens.

The report is organized into the following sections. In Section I, we set out the conventional case for the progressivity of the corporate tax. Section II examines the assumptions underlying the Hall-Jorgenson METR model, and Section III presents METR's calculated using the more general model. Section IV examines the Treasury tax proposal in light of our findings, and Section V sums up. Technical details are presented in an appendix.

I. Relative Tax Burdens, by Size of Corporations: The Conventional View*

There is a fundamental sense in which large corporations bear the brunt of the corporate income tax: nonfinancial corporations with more than $250 million in total assets (the largest size category defined by the IRS) accounted for almost 70 percent of corporate taxes paid over the

*The concepts of 'small' and 'large' corporations used in this report conform to IRS asset size definitions. 'Small' generally means corporations with total assets between zero and $25 million averaged over the 1977-1980 period. Occasionally we consider 'medium' size corporations which are those with assets between $1 million and $25 million. These definitions are, of course, arbitrary. One could equally well use employment or income as the basis for the small-large categorization. Much of the data used in this report is derived from IRS tax return data, and we are more or less constrained to use IRS size classifications.
Table 1
Distribution of Nonfinancial Corporate Income, Taxes and Tax Returns, 1977-80 (percentages)

<table>
<thead>
<tr>
<th>Corporations by asset size ($1000)</th>
<th>Percent of Income</th>
<th>Percent of Taxes</th>
<th>Percent of Tax Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100</td>
<td>1.3</td>
<td>0.4</td>
<td>55.22</td>
</tr>
<tr>
<td>100 to 250</td>
<td>2.0</td>
<td>0.7</td>
<td>18.89</td>
</tr>
<tr>
<td>250 to 500</td>
<td>2.3</td>
<td>1.1</td>
<td>10.95</td>
</tr>
<tr>
<td>500 to 1,000</td>
<td>2.9</td>
<td>1.8</td>
<td>7.13</td>
</tr>
<tr>
<td>1,000 to 5,000</td>
<td>8.0</td>
<td>7.2</td>
<td>6.43</td>
</tr>
<tr>
<td>5,000 to 10,000</td>
<td>3.2</td>
<td>3.2</td>
<td>0.69</td>
</tr>
<tr>
<td>10,000 to 25,000</td>
<td>4.0</td>
<td>4.2</td>
<td>0.39</td>
</tr>
<tr>
<td>25,000 to 50,000</td>
<td>2.9</td>
<td>3.1</td>
<td>0.12</td>
</tr>
<tr>
<td>50,000 to 100,000</td>
<td>3.3</td>
<td>3.4</td>
<td>0.07</td>
</tr>
<tr>
<td>100,000 to 250,000</td>
<td>5.4</td>
<td>5.7</td>
<td>0.05</td>
</tr>
<tr>
<td>over 250,000</td>
<td>64.6</td>
<td>69.1</td>
<td>0.06</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Corporation Source Book, Returns with and without net incomes.

Note: small = less than $1 million in assets, medium= assets between $1 million and $25 million, large = more than $25 million in assets.
1977-80 period, but only six-tenths of one percent of all tax returns. Conversely, the three smallest size categories shown in Table 1 accounted for only 5.6 percent of taxes paid, but 85 percent of all tax returns.

This notion of tax burden is, however, highly deficient. Corporations with assets of $250 million may have paid 70 percent of the corporate tax, but they also earned 65 percent of all income among nonfinancial corporations. It should not, therefore, be surprising that the corporate income tax is concentrated in the group that earns the most income. A more sensible measure of relative tax burden is thus required.

Tax burden per dollar of income is the obvious candidate for a measure of the relative tax burden on corporations of different sizes. There are, unfortunately, several ways of constructing this measure. First, one can estimate the average statutory rate faced by corporations in each size class. This measure indicates, on average, the statutory rate at which an additional dollar of income is taxed. To do this properly, however, would require information on the top tax bracket of each corporation in each size class. This is not possible without access to individual tax returns, and tax returns are not available to private researchers.

An alternative strategy is to calculate average income per return in each size class, and to look up the corresponding maximum statutory tax rate from IRS tax tables. We have done this for the years 1977-1980, and classes (zero to $500,000) exhibit average statutory tax rates at
or near minimum 1979-1981 statutory rate of 17 percent. The next class exhibits a statutory rate near the second 'step' of the corporate rate structure (20 percent). All other average marginal rates are at or near the maximum 46 percent tax rate. This measure of tax burden supports the conclusion that tax burdens rise with size of corporation.

A second measure of tax burden can be obtained by comparing the total tax burden of each size class to total income before taxes. The ratio of the former to the later yields the average effective tax rate on income originating in each size class—i.e., the actual tax on an average dollar of income in each class.

The problems associated with average effective tax rates are well known, and were summarized in our first report to SBA. Nevertheless, the average tax rate is a valuable conceptual device for summarizing the distribution of taxes per dollar income by size of corporation, particularly when averaged over a number of consecutive years.*

Average effective tax rates for the years 1977 to 1980 are shown in the second column of Table 2. These effective tax rates are based on IRS data reported in Corporation Source Book. The pattern of effective tax rates is quite similar to the pattern of marginal statutory rates shown in Column 1: tax rates rise continuously with asset size, with the largest jump occurring at $1 million. The basic conclusion remains unaltered: tax burdens rise with size of corporation.

* Averaging over consecutive years reduces problems associated with loss carryovers and other timing issues in the distribution of tax liabilities over the life of an investment.
Table 2

Income Tax Rates by Size of Corporation
Various Conventional Measures

<table>
<thead>
<tr>
<th>Non Financial Corporations by asset size ($1000)</th>
<th>Average Marginal Statutory Tax Rate</th>
<th>Average Effective Tax Rate</th>
<th>Marginal Effective Tax Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100</td>
<td>17.0</td>
<td>12.2</td>
<td>-7.3</td>
</tr>
<tr>
<td>100 to 250</td>
<td>17.0</td>
<td>13.8</td>
<td>-7.3</td>
</tr>
<tr>
<td>250 to 500</td>
<td>17.5</td>
<td>17.3</td>
<td>-6.9</td>
</tr>
<tr>
<td>500 to 1,000</td>
<td>21.8</td>
<td>22.9</td>
<td>-3.1</td>
</tr>
<tr>
<td>1,000 to 5,000</td>
<td>45.3</td>
<td>33.0</td>
<td>20.2</td>
</tr>
<tr>
<td>5,000 to 10,000</td>
<td>46.0</td>
<td>37.8</td>
<td>21.0</td>
</tr>
<tr>
<td>10,000 to 25,000</td>
<td>46.0</td>
<td>38.7</td>
<td>21.0</td>
</tr>
<tr>
<td>25,000 to 50,000</td>
<td>46.0</td>
<td>38.7</td>
<td>21.0</td>
</tr>
<tr>
<td>50,000 to 100,000</td>
<td>46.0</td>
<td>38.9</td>
<td>21.0</td>
</tr>
<tr>
<td>100,000 to 250,000</td>
<td>46.0</td>
<td>38.8</td>
<td>21.0</td>
</tr>
<tr>
<td>over 250,000</td>
<td>46.0</td>
<td>39.5</td>
<td>21.0</td>
</tr>
</tbody>
</table>

Note: small = less than $1 million in assets, medium= assets between $1 million and $25 million, large = more than $25 million in assets.
The final and most sophisticated measure of tax burden is based on the Hall-Jorgenson model of user cost of capital. Where the average effective tax rate measures the tax burden associated with income from past investment, the Hall-Jorgenson model produces effective tax rates on new investments. As a general rule, the tax burden on new investment will not be the same as the burden on past investment due to changes in the tax code. So, marginal effective tax rates are a better measure of the impact of current tax law on the incentive to invest.**

The technical complexities of the METR model are described in accompanying appendix; the model will also be discussed in greater detail in the following section. For summary purposes, however, we present estimates based on this model in the final column of Table 2. These estimates are based on current (1985) law, whereas the first two columns are based on actual IRS data for the 1977-1980 period. It is again apparent that tax burden rise with the size of the Corporation. The standard measures of tax burdens are all in agreement on this point.

**The average effective tax rate (AETR) measures the historical impact of past provisions of the tax code. These historical provisions generally do not provide an accurate picture of the tax incentives and disincentives facing a corporation contemplating a new investment. Nor does the AETR accurately portray the tax incentive over the life of the investment - it provides only a 'snapshot' of tax burdens in any one year. Finally, the AETR cannot capture the differential impact of the tax code on various types of plant, equipment, and inventories.
II. Marginal Effective Tax Rates: A Closer Look

Much of the recent debate over tax reform has taken place within the context of the cost of capital or marginal effective tax rate model. For example, Tables 6-4 and 6-5 in Volume I of the Treasury tax proposal contain METR's for three broad types of capital, and show that the proposed changes would reduce the overall METR relative to current law. Because of the importance attached to the concept of marginal effective tax rate in the current debate it is useful to examine the model more closely. Such examination is all the more important because it reveals underlying assumptions that may have the effect of understating the true tax burden on small businesses.

For purposes of exposition, consider the cost of capital for a hypothetical financial asset. Suppose a tax-exempt bond costs $100 and yields an annual return of 10 percent or $10. The cost of lending the bond to someone else for one year -- that is, giving up the income from the bond for that year -- is $10.

Alternatively, consider a corporate bond costing $100. In order to induce someone in the 50 percent income tax bracket to hold this bond, it must yield 20 percent before taxes. After taxes, the bond yields 10 percent and is comparable to the tax exempt alternative. The user cost, in this case, is $20; this is the amount that the owner must charge the user in order to part with the value of the bond for one year.

*These findings have been corroborated by Gravelle (1984) and Hulten (1985).
Continuing the example, consider a $100 machine rather than a $100 bond. To return $10 to the owner in the 50 percent tax bracket, the machine must earn more than $20 because it depreciates (i.e., loses value as it wears out from use in production or becomes obsolete). If the machine depreciates at 10 percent per year, then the depreciation cost is $10 in the first year. To yield the same return as the bond the machine must earn $30 in the first year. Taxable income is $20 ($30 less $10 depreciation), and after tax income is $10. After one year of depreciation the machine is worth only $90, but $10 tax free is available to keep the original investment intact.

This example describes a situation in which tax depreciation allowances are based on true, or 'economic' depreciation. Over the years, the Congress has permitted taxpayers to write-off more of their investment in the early years of investment life than is dictated by economic depreciation. For example, taxpayers might take a depreciation deduction of $20 in the first year of the investment, rather than the $10 deduction associated with true depreciation. In this case, taxable income is only $10 ($30-$20 depreciation), taxes are only $5, and after tax income is then $15.

With more generous depreciation deductions, the return to the asset has increased, making it a more attractive investment. Of course, the increase in one year's depreciation allowance means that later year's allowances are reduced since total deductions are generally limited to the original cost of the asset ($100 in our example). Nevertheless,
the acceleration of depreciation allowances is beneficial to the
taxpayer with constant marginal tax rates, because a dollar of tax
liability saved through a deduction available today can earn interest
and is, therefore, more valuable than postponement of that deduction to
a later year. The present value of the stream of accelerated
depreciation deductions is larger.

The present values of depreciation deductions allowable under current
law are shown in the first row of Table 3. The Accelerated Cost
Recovery System (ACRS) defines five 'recovery' classes of assets with
write-off periods of 3, 5, 10, and 15 years (the 10 and 15 year
recovery classes refer mainly to public utility property and are not
considered explicitly in this analysis). The recovery period for
structures is currently 18 years, while inventories and land are not
considered to be depreciable assets and are not part of ACRS.

Table 3 indicates that the present value of depreciation allowances in
the three-year recovery class is $94.58 per $100 of investment. This
figure is obtained in the following way: the first year write-off is
$25, the second year write-off is $38, and the final write-off is $37.*

A discount rate of 5.17 percent is assumed to apply to all assets, regardless
of type of size of firm in which they are used.** The present value is

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*The first year's figure is only $25 because it is assumed that
the average investment is placed in service in the middle of the year
and is entitled to only one half year's depreciation.

** This discount rate is the sum of the real discount rate assumed to
be 4 percent and the implied expected rate of inflation of 1.17
percent. This low expected rate of inflation is implied by our
assumption that the class of largest corporations are fully
arbitraged. This assumption is explored more fully below.
Table 3
Various Aspects of the Conventional User Cost of Capital
($ per $100 investment or percentage)

<table>
<thead>
<tr>
<th></th>
<th>3 Year Equipment</th>
<th>5 Year Equipment</th>
<th>Nonresidential Structures</th>
<th>Inventory and Land</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRESENT VALUE OF DEPRECIATION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax Depreciation</td>
<td>94.58</td>
<td>90.12</td>
<td>70.94</td>
<td>0</td>
</tr>
<tr>
<td>Economic Depreciation</td>
<td>89.19</td>
<td>78.95</td>
<td>42.86</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL TAX SAVING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>21.99</td>
<td>24.92</td>
<td>12.36</td>
<td>0</td>
</tr>
<tr>
<td>Medium</td>
<td>47.64</td>
<td>48.86</td>
<td>32.20</td>
<td>0</td>
</tr>
<tr>
<td>Large</td>
<td>48.20</td>
<td>49.38</td>
<td>32.63</td>
<td>0</td>
</tr>
<tr>
<td><strong>USER COST OF CAPITAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>34.96</td>
<td>17.28</td>
<td>7.43</td>
<td>4.84</td>
</tr>
<tr>
<td>Medium</td>
<td>35.47</td>
<td>17.79</td>
<td>8.69</td>
<td>7.33</td>
</tr>
<tr>
<td>Large</td>
<td>35.49</td>
<td>17.81</td>
<td>8.73</td>
<td>7.41</td>
</tr>
<tr>
<td><strong>EFFECTIVE TAX RATE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>-104.5%</td>
<td>-75.7%</td>
<td>9.7%</td>
<td>17.4%</td>
</tr>
<tr>
<td>Medium</td>
<td>-61.7%</td>
<td>-43.2%</td>
<td>29.7%</td>
<td>45.4%</td>
</tr>
<tr>
<td>Large</td>
<td>-60.6%</td>
<td>-42.3%</td>
<td>30.2%</td>
<td>46.0%</td>
</tr>
</tbody>
</table>

a/ 'Small' Corporations: less than $1 million assets. Applicable average statutory rate is 17.4%.

b/ 'Medium' Corporations: between $1 million and $25 million in assets. Applicable statutory tax rate is 45.4%.

c/ 'Large' Corporations: more than $25 million in assets. Applicable statutory tax rate is 46%.
calculated as:

\[ 25 + \frac{38}{1.0517} + \frac{37}{1.0517^2}. \]

The corresponding present value of economic depreciation is shown in Row 2 of Table 3. It is generally smaller than the tax depreciation figures, because ACRS tax depreciation allowances are more accelerated than economic depreciation, except for the three-year recovery class.\(^*\)

This does not mean that all corporations derive the same benefit from tax depreciation allowances, nor does it mean that they have the same cost of capital. The variation in statutory tax rates applied to corporations of different size is itself sufficient to introduce variation in the user cost of capital by size of corporation.

Recall, from Table 2, that the average of the smallest corporations faced a 17 percent statutory tax rate, while the largest corporations faced a 46 percent statutory rate in the 1977-1980 period. This variation implies that the value of depreciation deductions differs according to size of firm: the smallest corporations save 17 cents per dollar of deduction, while large corporations save 46 cents per dollar of deduction. Table 3 shows just how much these tax savings actually vary across corporations.

\(^*\) This is true even though economic depreciation is indexed (i.e., adjusted for inflation which ACRS depreciation is not.) Mechanically, this means that a real (4 percent) discount rate is used in the computation over the economic depreciation present value, while a discount rate which includes inflation (5.17 percent) is used in the ACRS computation. At lower rates of inflation, all ACRS classes have a smaller present value of tax depreciation than that implied by economic depreciation.
of three different size classes.*

Rows 3, 4, and 5 show total tax savings (TTS) for the three size classes. TTS is defined as the applicable statutory rate times the present value of tax depreciation, plus an adjustment for the investment tax credit (ITC). A 6 percent credit applies to investment in 3 year ACRS assets (that is, a credit of $6 per $100 of investment may be applied to tax liability), and a 10 percent ITC is available for 5 year ACRS assets. Most structures do not qualify for the ITC, nor do inventories and land. The TTS figures reflect the ITC in two ways: the present value of tax depreciation is reduced by one-half the rate of the ITC—the 'basis adjustment'—, and the full rate of the ITC is added to this result multiplied by the statutory tax rate. The data in Table 3 shows that this procedure results in a tax saving that increases with size class.

What does this imply for effective tax rates? Average statutory tax rates rise with size, increasing the tax liability per dollar of profit. Total tax saving also increases, and if it increases faster than average statutory tax rates, the final tax bill (per dollar of income) falls. This implies that the effective tax rates also fall. The last rows of Table 3 reveal that within any class of assets, the

*This three-way classification combines the first four IRS asset size classes into 'small', the next three into 'medium', and the remaining classes into 'large'. 
METR rises with size of nonfinancial corporations. This implies that differences in the TTS do not compensate for differences in the statutory tax rates. This result is reflected in the METR's shown in Table 2. Table 3 confirms that this result holds on an asset-by-asset basis, and that each type of asset is taxed more lightly in small corporations than in their larger counterparts.

*The analytical steps by which the METR is extracted from the statutory tax rate and the TTS is covered in the technical appendix. However, the steps involved can be outlined briefly. The user cost of capital is first calculated by computing the ratio:

\[
\frac{\text{one minus the TTS}}{\text{one minus the average statutory tax rate}}
\]

This ratio is multiplied by the real discount rate (assumed to be 4 percent) plus the rate of economic depreciation. Then, the rate of economic depreciation is subtracted from the user cost to obtain the hurdle rate of return. Finally, the METR is calculated by subtracting the real rate of discount from the hurdle rate, and then dividing by the latter.
III. Generalization of the Marginal Effective Tax Rate Model

Our detailed analysis of the METR model reveals an interesting fact: the statutory tax rate is the only parameter of the model that varies by size of firm. This means that the distribution of tax burden across size categories is driven by a parameter that is known to increase with size. For plausible values of the other parameters, the METR is bound to increase as well.*

In actuality, small corporations differ from their larger counterparts in many ways. In this section, we focus on three areas in which differences occur: (1) differences in asset composition, (2) differences in discount rates, and (3) differences in the value of interest deductions. While hardly exhaustive, this list is sufficient to greatly alter the perceived progressivity of effective corporate tax rates.

A. Asset Composition

Table 3 shows that effective tax rates vary greatly across assets. Inventory investment bears a heavy tax burden, while equipment is lightly taxed. The overall effective tax rate reflects the weights in the average across asset types. The weights used are the value of the stocks of each type of asset.

This weighting procedure embodies the assumption that firms of every size use the same combinations of assets. It is possible that this is

*The term 'plausible' refers here to total tax savings for all assets of less than 100 percent of asset cost, when TTS is divided by the statutory tax rates.
an important assumption, since the effective tax rate varies so much across assets. Just how important is it? We must appeal to the data for some measure.

IRS Corporation Source Book data provide separate detail for inventories, land, and 'depreciable, depletable, and amortizable' assets although these data do not distinguish between structures and equipment. The available detail is shown in Table 4, where it is evident that inventories and land are more intensively used in midsize corporations, and that the largest corporations are the least intensive in these assets.*

What does this do to the METR's of the preceding sections? We have recalculated the METR's of Table 2, changing only the internal weighting of the individual asset METR's of Table 3. The result, reported in column 2 of Table 5, shows that this impact on METR's is substantial. The distribution of tax burdens is now shaped like an inverted 'U', with midsized corporations experiencing the heaviest tax burdens.

B. Discount Rates

The METR's of Tables 2 and 3 were computed under the assumption that corporations of all sizes have a common after-tax real rate of return of 4 percent. This common rate of discount may be justified on a priori grounds by the assumption that capital flows to its most

*We have revalued IRS book value data to approximate market values which results in a substantial upward adjustment of the value of assets in the 1977-80 period. This procedure is described in appendix section D.
Table 4
Distribution of Tangible Assets by Type of Asset and Size of Corporation (percentages)

<table>
<thead>
<tr>
<th>Corporations by asset size ($1000)</th>
<th>Depreciable Depletable and Amortized Assets</th>
<th>Land</th>
<th>Inventory</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100</td>
<td>74.7</td>
<td>2.9</td>
<td>22.5</td>
<td>100.0</td>
</tr>
<tr>
<td>100 to 250</td>
<td>65.7</td>
<td>5.4</td>
<td>28.9</td>
<td>100.0</td>
</tr>
<tr>
<td>250 to 500</td>
<td>61.5</td>
<td>6.6</td>
<td>31.9</td>
<td>100.0</td>
</tr>
<tr>
<td>500 to 1000</td>
<td>58.6</td>
<td>6.6</td>
<td>34.8</td>
<td>100.0</td>
</tr>
<tr>
<td>1000 to 5000</td>
<td>57.7</td>
<td>5.3</td>
<td>37.0</td>
<td>100.0</td>
</tr>
<tr>
<td>5000 to 10,000</td>
<td>61.7</td>
<td>4.2</td>
<td>34.1</td>
<td>100.0</td>
</tr>
<tr>
<td>10,000 to 25,000</td>
<td>62.7</td>
<td>3.6</td>
<td>33.7</td>
<td>100.0</td>
</tr>
<tr>
<td>25,000 to 50,000</td>
<td>66.5</td>
<td>3.4</td>
<td>30.1</td>
<td>100.0</td>
</tr>
<tr>
<td>50,000 to 100,000</td>
<td>66.9</td>
<td>3.1</td>
<td>30.0</td>
<td>100.0</td>
</tr>
<tr>
<td>100,000 to 250,000</td>
<td>70.9</td>
<td>2.7</td>
<td>26.4</td>
<td>100.0</td>
</tr>
<tr>
<td>over 250,000</td>
<td>85.4</td>
<td>1.3</td>
<td>13.3</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note: small = less than $1 million in assets, medium = assets between $1 million and $25 million, large = more than $25 million in assets.
profitable after-tax use, after adjustment for risk differentials.

While this is a plausible long-run assumption, it is not necessarily valid for finite spans of time. Imperfections in the financial markets and adjustment lags in the installation of physical capital can create variations in the marginal discount rates used by firms in different industries and firms of different sizes. While one would not expect this variation to persist, it is at least worth checking to see if possible variations introduce significant differences in METR's.

To investigate this possibility, we used IRS data to compute a discount rate for each size class of corporation. Our discount rate is defined as the real after-tax cost of debt and equity to the corporation — i.e. the weighted average of the return to equity and the net cost of borrowing.* The discount rate calculated in this way is shown in the last column of Table 6. The impact of changing the 4 percent discount rate to the new is shown in column (3) of Table 5.

It is readily apparent that the change in discount rates does not greatly change the distribution of tax burdens relative to the base case. If anything, the distribution appears more favorable to small

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*Specifically, the return to equity was calculated on the market value of assets and adjusted after-tax profit. This figure was then multiplied by the ratio of equity to asset value, and then added to net borrowing cost multiplied by the debt-asset ratio. Net borrowing cost was calculated by multiplying an estimate of the interest rate adjusted for inflation (see appendix section D) for each size class by one minus the applicable statutory tax rate. The tax rate adjustment necessary to reflect the fact that interest payments can be deducted from taxable income.
## Table 5

META's Calculated with More General Assumption about Small and Large Corporations

<table>
<thead>
<tr>
<th>Corporations by asset size ($1000)</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>from standard case</td>
<td>METR's</td>
<td>Change</td>
<td>Change</td>
<td>Change</td>
<td>Combine</td>
<td>Combine</td>
<td>Combine</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td></td>
<td>asset</td>
<td>discount</td>
<td>arbitrage</td>
<td>(2)&amp;(3)</td>
<td>(2)&amp;(4)</td>
<td>(3)&amp;(4)</td>
<td>Effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>weights</td>
<td>rate</td>
<td>assumption</td>
<td></td>
<td></td>
<td></td>
<td>Together</td>
</tr>
<tr>
<td>Less than 100</td>
<td>-7.3</td>
<td>-6.0</td>
<td>257.8</td>
<td>12.3</td>
<td>281.1</td>
<td>12.8</td>
<td>74.0</td>
<td>55.3</td>
</tr>
<tr>
<td>100 to 250</td>
<td>-7.3</td>
<td>-2.6</td>
<td>-12.9</td>
<td>12.3</td>
<td>-6.8</td>
<td>13.9</td>
<td>31.8</td>
<td>7.2</td>
</tr>
<tr>
<td>250 to 500</td>
<td>-6.9</td>
<td>-.1</td>
<td>-16.0</td>
<td>13.3</td>
<td>-6.7</td>
<td>15.4</td>
<td>37.9</td>
<td>13.9</td>
</tr>
<tr>
<td>500 to 1000</td>
<td>-3.1</td>
<td>4.5</td>
<td>-15.1</td>
<td>15.2</td>
<td>-3.0</td>
<td>18.2</td>
<td>41.6</td>
<td>20.0</td>
</tr>
<tr>
<td>1000 to 5000</td>
<td>20.2</td>
<td>28.7</td>
<td>16.5</td>
<td>20.8</td>
<td>26.6</td>
<td>29.1</td>
<td>47.3</td>
<td>31.6</td>
</tr>
<tr>
<td>5000 to 10000</td>
<td>21.0</td>
<td>28.0</td>
<td>19.9</td>
<td>21.0</td>
<td>27.3</td>
<td>28.0</td>
<td>42.7</td>
<td>29.9</td>
</tr>
<tr>
<td>10000 to 25000</td>
<td>21.0</td>
<td>27.6</td>
<td>20.3</td>
<td>21.0</td>
<td>27.2</td>
<td>27.6</td>
<td>40.4</td>
<td>29.6</td>
</tr>
<tr>
<td>25000 to 50000</td>
<td>21.0</td>
<td>26.1</td>
<td>22.4</td>
<td>21.0</td>
<td>27.1</td>
<td>26.1</td>
<td>34.1</td>
<td>26.8</td>
</tr>
<tr>
<td>50000 to 100000</td>
<td>21.0</td>
<td>25.9</td>
<td>21.4</td>
<td>21.0</td>
<td>26.2</td>
<td>25.9</td>
<td>30.5</td>
<td>26.9</td>
</tr>
<tr>
<td>100000 to 250000</td>
<td>21.0</td>
<td>24.2</td>
<td>21.2</td>
<td>21.0</td>
<td>24.4</td>
<td>24.2</td>
<td>28.6</td>
<td>24.2</td>
</tr>
<tr>
<td>over 250000</td>
<td>21.0</td>
<td>17.4</td>
<td>20.8</td>
<td>21.0</td>
<td>17.2</td>
<td>17.4</td>
<td>20.8</td>
<td>15.3</td>
</tr>
</tbody>
</table>

Note: small = less than $1 million in assets, medium = assets between $1 million and $25 million, large = more than $25 million in assets.

(1) - discount rate = .04, debt/asset = 0, uniform asset weights
(2) - discount rate = .04, debt/asset = 0, size specific asset weights
(3) - discount rate = composite, debt/asset = 0, size specific asset weights
(4) - discount rate = .04, debt/asset = actual, uniform asset weights
(5) - discount rate = composite, debt/asset = 0, size specific asset weights
(6) - discount rate = .04, debt/asset = actual, size specific asset weights
(7) - discount rate = composite, debt/asset = actual, uniform asset weights
(8) - discount rate = composite, debt/asset = actual, size specific asset weights
Table 6
Rates of Return and Other Ratios of Size Class of Corporation

<table>
<thead>
<tr>
<th>Corporations by asset size ($1000)</th>
<th>Before-tax Rate of Return on Assets</th>
<th>Interest rate</th>
<th>Debt-asset ratio</th>
<th>Rate of Return on Equity</th>
<th>After-tax cost of Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100</td>
<td>3.2</td>
<td>10.7</td>
<td>30.6</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>100 to 250</td>
<td>5.7</td>
<td>13.6</td>
<td>30.5</td>
<td>3.9</td>
<td>2.7</td>
</tr>
<tr>
<td>250 to 500</td>
<td>5.7</td>
<td>13.7</td>
<td>32.4</td>
<td>3.5</td>
<td>2.4</td>
</tr>
<tr>
<td>500 to 1000</td>
<td>5.8</td>
<td>13.1</td>
<td>34.7</td>
<td>3.1</td>
<td>2.0</td>
</tr>
<tr>
<td>1000 to 5000</td>
<td>6.4</td>
<td>13.4</td>
<td>37.0</td>
<td>2.9</td>
<td>1.8</td>
</tr>
<tr>
<td>5000 to 10000</td>
<td>7.0</td>
<td>13.4</td>
<td>36.1</td>
<td>3.4</td>
<td>2.2</td>
</tr>
<tr>
<td>10000 to 25000</td>
<td>7.0</td>
<td>13.1</td>
<td>35.1</td>
<td>3.5</td>
<td>2.3</td>
</tr>
<tr>
<td>25000 to 50000</td>
<td>7.4</td>
<td>12.8</td>
<td>33.1</td>
<td>4.1</td>
<td>2.7</td>
</tr>
<tr>
<td>500000 to 100000</td>
<td>6.9</td>
<td>11.5</td>
<td>33.4</td>
<td>3.7</td>
<td>2.5</td>
</tr>
<tr>
<td>1000000 to 250000</td>
<td>6.6</td>
<td>11.1</td>
<td>31.6</td>
<td>3.6</td>
<td>2.4</td>
</tr>
<tr>
<td>over 250000</td>
<td>5.9</td>
<td>9.6</td>
<td>29.1</td>
<td>3.3</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Note: small = less than $1 million in assets, medium = assets between $1 million and $25 million, large = more than $25 million in assets.
This general result is also obtained with a discount rate based on the return to equity alone and with a higher rate of inflation. In sum, variation in the rate of discount (within plausible ranges) does not appear to affect the conclusions drawn from the standard METR model.

C. The Debt-Equity Ratios and the Deductibility of Interest Payments

The standard model of Table 2 contains the implicit assumption that the means used to finance an investment—debt or equity—do not affect the METR. All projects which earn an after-tax real rate of return of 4 percent or larger are accepted, implying that the real after-tax cost of finance is 4 percent for all sources. Unfortunately, this implicit assumption does not take into account the fact that the tax code allows for deductibility of interest payments.

The discount rate introduced in the preceding subsection has the effect of bringing the debt-equity ratio into the analysis. When the cost of

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*The implausible estimate for the smallest class reflects the fact that the discount rate is nearly zero. This is not entirely surprising, since this class contains the majority (55 percent) of the tax returns filed and very little of the corporate income earned (1.3 percent). This segment of the corporate sector contains many small personal corporations, and might well be dropped from the analysis of the report. The corporate form of organization plays a different role for many such entities, i.e., it shelters income from the upper bracket of the individual income tax while limiting personal liability for losses.

**Note that our estimated discount rates are 'average' rather than 'marginal' estimates. That is, they represent average cost of funds and not the cost of raising an additional investment dollar. The marginal cost of funds may vary more than the average cost across size classes, so the conclusion of this section must be used with caution.
equity finance exceeds the net cost of borrowing, the new discount rate will vary with the debt-equity ratio. As this ratio increases the average cost of funds will fall.

This debt-equity ratio is thus linked to the METR through the discount rate (although this link does not appear to be empirically significant). Actually, the story is more complicated than that suggested by this link alone. Interest payments are deductible by the borrower, but are taxable as income to the lender. This implies that the rate of interest will be affected by the statutory tax rates of both borrowers and lenders. When this effect is taken into account in the METR model, conclusions about the relative tax burden by size of firm change significantly.

This second link between the METR model and the debt-equity ratio - which we term the 'arbitrage effect', - is complicated and difficult to describe. The following example illustrates the intuition underlying the arbitrage effect; technical details are provided in Section B of the appendix.

Consider a world in which the interest rate is 5 percent and there are no taxes or inflation. The net borrowing cost is 5 percent and all firms will invest up to the point that marginal physical capital earns 5 percent. This situation is portrayed in the first column of Table 7. Suppose that a graduated income tax is enacted where a 'large' taxpayer is subject to a 50 percent tax rate, and 'small' taxpayer to a 25 percent tax rate. Interest payments are deductible from the income of the borrower and included in the taxable income of the lender.
Upon imposition of the tax, lenders find that the 5 percent coupon bonds that they hold now yield only 2.5 percent if they are large taxpayers, and 3.75 percent if they are small. If there is a plentiful supply of projects that yield a net after-tax return of 5 percent (e.g. municipal bonds or owner occupied housing), the large taxpayer will be willing to lend only when the interest rate on bonds rises to 10 percent. Small taxpayers will start lending when the interest rate rises to 6.67 percent.

This tax-induced increase in interest rates is the key to the arbitrage effect. The market adjusts so as to shift the tax burden on interest income from lenders to borrowers. The borrowers will then be subjected to an indirect tax burden which shows up on their books as an increase in interest costs.

The full burden of the increase in interest cost is not borne by borrowers, because they deduct interest payments from taxable income. To see the implications of this, consider the case of the large taxpayer. This taxpayer can borrow at a 6.67 percent interest rate (from small taxpayers) or 10 percent (from large taxpayers). The former option is presumably chosen, resulting in an interest cost of $6.67 per $100 borrowed. The borrower can deduct this $6.67, and at a 50 percent tax rate the net cost is $3.34. So, for the large taxpayer the net interest rate is 3.34 percent. The taxpayer can use the borrowed funds to purchase an asset which (by hypothesis) earns a 5 percent net return. The net gain per unit of investment is thus 1.67 percent. This 1.67 percent is termed the 'arbitrage wedge', because
the investor can arbitrage between real capital and debt and realize a pure profit of 1.67 percent.

Investors in the 50 percent tax bracket wish to borrow indefinitely to obtain the arbitrage profit. As they attempt to do so, they ultimately exhaust the supply of debt offered by small taxpayers at 6.67 percent. Further borrowing must be obtained from large taxpayers, and this will force the interest rate up to 10 percent. With a 10 percent interest rate, the net borrowing cost is 5 percent which exactly matches the 5 percent net return to the asset, and the arbitrage wedge becomes zero.

The large taxpayer is now in the following situation: the net borrowing cost is the same as it was before the tax was imposed, although the gross interest rate has doubled; tax exempt physical capital earns a net return, as before the tax; taxable physical capital earns a gross return of 10 percent before tax (under economic depreciation and no tax credits), and a 5 percent net return, as before the tax. In this situation, there is no more advantage to borrowing than before the tax was imposed. Indeed, there is no advantage at all to borrowing. The debt-equity ratio is indeterminant.

This situation is portrayed in the second column of Table 7. This column also portrays the circumstances of the small taxpayer after the interest rate has been bid up to 10 percent by arbitrage. Being in the 25 percent tax bracket, the net borrowing cost to the small taxpayer is

*Note also, that the effective tax rate is 50 percent on all capital income. Payments to equity are taxed at 50 percent, and lenders receive 10 percent before-tax and pay a tax of 50 percent.
Table 7
Example Illustrating the Arbitrage Effect

<table>
<thead>
<tr>
<th></th>
<th>No Tax case</th>
<th>Tax case</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Small taxpayer</strong> (25% tax rate)</td>
<td>ir= 5%</td>
<td>ir= 10%</td>
</tr>
<tr>
<td></td>
<td>nbc= 5%</td>
<td>nbc= 7.5%</td>
</tr>
<tr>
<td></td>
<td>ror= 5%</td>
<td>ror= 5.0%</td>
</tr>
<tr>
<td><strong>Large taxpayer</strong> (50% tax rate)</td>
<td>ir= 5%</td>
<td>ir= 10%</td>
</tr>
<tr>
<td></td>
<td>nbc= 5%</td>
<td>nbc= 5%</td>
</tr>
<tr>
<td></td>
<td>ror= 5%</td>
<td>ror= 5%</td>
</tr>
</tbody>
</table>

*ir= 'interest rate',
nbc= 'net borrowing cost',
ror= 'rate of return to physical capital after-tax'
7.5 percent - each dollar of deduction only shields 25 cents in tax. With this net borrowing cost, the arbitrage wedge for the small taxpayer is reversed - a dollar's worth of physical capital yields 5 percent and costs 7.5 percent.

The reversal of the arbitrage wedge implies that the small taxpayer should become a lender and earn a net 7.5 percent on debt rather than a 5 percent on equity. Indeed, we have assumed that the interest rate reaches 10 percent after all loanable funds have been induced out of small taxpayers.

Suppose that our small taxpayer does not want to 'go out of business' and live off of interest payments and labor income. In this case, all investment should be financed with equity funds which cost 5 percent and earn 5 percent net of tax, and not debt which cost 7.5 percent.

This lengthy example illustrates the major issues in debt finance by size class of firm. In this simplified example, the interest rate rises to the point that all equity should be in the hands of the top tax bracket investors, and individuals in other tax brackets should hold debt (i.e. their claims against physical capital should be realized via debt). In this case, the debt-equity ratio is indeterminant, and the standard Hall-Jorgenson model applies.

When those in the lower tax brackets do hold equity, the debt-equity ratio should be zero. In this case also, the debt-equity ratio drops out of the analysis, and the standard Hall-Jorgenson model applies.

But what if low tax bracket investors insist on operating physical
capital and borrowing to finance it? In our example, they pay a premium of 2.5 percent, and this premium is due to the tax liability shifted from lender to borrower. When this indirect tax liability is added to direct taxes, the marginal effective tax rate rises.

How is this negative arbitrage wedge built into the METR? The technical details are presented in Section B of the appendix. It suffices to note that the extension is relatively straightforward.

Is it reasonable to assume small taxpayers actually borrow when the arbitrage wedge is negative? The debt-to-market-value-of-asset ratios shown in Table 6 show that the ratio does not vary dramatically by size class of firm: it rises from 31 percent to 37 percent and then falls to 29 percent. This pattern is confirmed in Table 8, where the percentage of total capital income going to interest payments is relatively constant.

Of course, the fact that Tables 6 and 8 show that smaller corporations borrow does not necessarily mean that they experience a negative arbitrage wedge, and thus higher METR's. The IRS data of Table 6 and 8 refer to the average firm in each size class, and there may well be firms with higher than average rates of return or statutory tax rates. The data of Tables 6 and 8 may be accounted for by such firms, which are justified in borrowing.

It is instructive to calculate METR's as though all firms within each size class are identical and thus have negative arbitrage wedges. This calculation is carried out for each size class by multiplying the class
Table 8
Allocation of Payments to Capital by Size of Corporation (percentages)

<table>
<thead>
<tr>
<th>Corporations by asset size ($1000)</th>
<th>Interest</th>
<th>Depreciation etc.</th>
<th>Income before taxes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100</td>
<td>22.7</td>
<td>57.6</td>
<td>19.7</td>
<td>100.0</td>
</tr>
<tr>
<td>100 to 250</td>
<td>19.7</td>
<td>38.2</td>
<td>42.1</td>
<td>100.0</td>
</tr>
<tr>
<td>250 to 500</td>
<td>21.9</td>
<td>35.6</td>
<td>42.5</td>
<td>100.0</td>
</tr>
<tr>
<td>500 to 1000</td>
<td>23.5</td>
<td>33.3</td>
<td>43.2</td>
<td>100.0</td>
</tr>
<tr>
<td>1000 to 5000</td>
<td>23.7</td>
<td>30.2</td>
<td>46.1</td>
<td>100.0</td>
</tr>
<tr>
<td>5000 to 10000</td>
<td>22.6</td>
<td>29.4</td>
<td>48.0</td>
<td>100.0</td>
</tr>
<tr>
<td>10000 to 25000</td>
<td>21.6</td>
<td>27.8</td>
<td>50.6</td>
<td>100.0</td>
</tr>
<tr>
<td>25000 to 50000</td>
<td>20.6</td>
<td>26.3</td>
<td>53.1</td>
<td>100.0</td>
</tr>
<tr>
<td>50000 to 100000</td>
<td>21.5</td>
<td>26.1</td>
<td>52.4</td>
<td>100.0</td>
</tr>
<tr>
<td>100000 to 250000</td>
<td>20.4</td>
<td>26.8</td>
<td>52.8</td>
<td>100.0</td>
</tr>
<tr>
<td>over 250000</td>
<td>19.6</td>
<td>29.3</td>
<td>51.1</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note: small = less than $1 million in assets, medium= assets between $1 million and $25 million, large = more than $25 million in assets.
interest rate (see Table 6) by one minus the average class statutory tax rate, and subtracting the result from the real discount rate (the last column of Table 6) adjusted for the rate of inflation.*

The resulting METR's are shown in column 4 of Table 5. The METR's for the largest corporations are unchanged from Table 2, since the statutory tax rate is 46 percent for these corporations, and the discount rate (4 percent and interest rate are assumed not to vary in this particular case.** As expected, the METR's of the remaining size classes are pulled up by the arbitrage adjustment.

We emphasize that the precise magnitude of the arbitrage effect is highly speculative. We have imposed full arbitrage on the largest corporations, but this resulted in an implausibly low implied expected rate of inflation. A high rate of inflation would assign a positive arbitrage effect to larger corporations and lower their METR's downward to the level of the small corporation METR's. This effect is explored in an appendix table analogous to Table 5. An inflation rate of 7.7 percent is used in these alternative tables. This is the average historical inflation rate for the years 1976-80.

*The expected rate of inflation is determined endogenously. Assuming that the largest size class has a zero arbitrage wedge, we calculate the expected rate of inflation that brings the net borrowing cost into equality with the real discount rate. Expected rates of inflation calculated in this way turn out to be quite small (between one and two percent), suggesting that the largest corporations probably were not fully arbitrated in the 1977-80 period. This is not surprising given the rapid surge of inflation in the 1970's.

**For the cases in which the discount rate is assumed to vary with size, the interest rate adjustment for size class is described in appendix section D.
Note further that interest rates are determined by other factors in addition to tax policy. Monetary and fiscal policy, international economic conditions, and saving rates are also important determinants. Our simplified model has assumed a perfectly elastic supply of savings and thus does not capture these other important effects.

Still, the arbitrage effect is a factor which has been ignored in past work and which touches on the relative tax burdens of small and large corporations. The estimates of this report suggest the order of magnitude that the arbitrage effect can have if it is assumed to work with full force on observed debt-equity ratios.

D. All Effects Combined

The last four columns of Table 5 show various combinations of the three adjustments to the standard METR model. The last column presents the 'bottom line'. The combined effect of all three adjustments on the distribution of tax burdens is seen to be very favorable to the largest size class of corporation and unfavorable to all others. In point of fact, the smallest size class of nonfinancial corporations experiences the largest increase in their METR's, although the heaviest absolute burden is on the $1 million to $5 million size class (the small class aside).

This new distribution of effective tax burdens is no longer progressive. Conclusions based on the standard METR model must therefore be viewed
with suspicion. While we do not claim to have measured the actual
distribution of tax burden, we do claim to have shown that the
genralization of the standard model to include size specific firm
characteristics can radically alter the results of the conventional
model.
IV The Treasury Tax Plan

The treasury tax reform proposal, if enacted, would substantially restructure the existing corporate income tax code. The Treasury plan is actually a collection of dozens of separate proposals whose aggregate revenue effect is estimated by Treasury to be $165 billion for the years 1986-1990. The following 'big ticket' items account for most of the revenue effects:

1. Reduction of maximum corporate rate to 33 percent.
2. Deduction for one half of dividends paid.
3. Repeal of investment tax credit.
4. Establish indexed economic depreciation as the basis for capital cost recovery.
5. Allow indexed FIFO inventory.
6. Limit industry specific subsidies and tax shelters.
7. Repeal graduated corporate rate structures.

Each of these provisions touches small corporations in one way or another. However, the last item is clearly targeted to small corporations which, according to Table 2, have statutory rates below the maximum.

How do these provisions affect the METR's associated with corporations of different sizes? The answer is surprisingly straightforward, at least for an equity financed investment: the METR for all corporations (with income) equals the statutory rate of 33 percent on undistributed profits and 19.8 percent on profits distributed as dividends.

This result follows because indexed economic depreciation is the basis
for the Treasury's capital consumption allowances. In the Treasury's new system the Real Cost Recovery System (RCRS) -- depreciation is not limited to the original cost of the investment. Instead, the undepreciated amount is increased to reflect the general increase in the level of prices. Unlike the current Accelerated Cost Recovery System (ACRS), RCRS allows the taxpayer to keep the real value of tax depreciation allowances intact in the face of inflation.

RCRS allowances are structured so as to approximate economic depreciation, and the approximation is close in spite of the use of only seven classes. The closeness of the approximation is significant: if statutory and economic depreciation rates are equal and there is no investment tax credit, then statutory and effective tax rates are equal.

To see why, recall the example discussed in Section II of a $100 investment which yields $30 of gross revenue and which depreciates at 10 percent a year. Economic depreciation is $10 in the first year of the investment's life. When economic depreciation is allowed as a tax deduction, taxable income is 20. This is also equal to economic income. With a statutory tax rate of 50 percent, tax liability is $10 (i.e. .50 * 20). The effective tax rate is then tax liability divided by taxable income or 50 percent. In other words, the effective tax rate is the same as the statutory tax rate.

Alternatively, if tax depreciation is accelerated from $10 to $20, taxable
income is $10 and tax liability is $5. Since economic income is still $20, the effective tax rate is 25 percent, even though the statutory rate is 50 percent.

What does this imply for the METR model? Since the investment tax credit is abolished in the Treasury plan, the elimination of the graduated rate structure means that corporations will experience a common METR of 33 percent on undistributed (nondividend) profit — i.e. income which is retained and therefore does not qualify for dividend relief.

The Treasury proposal specifies that one half of profits paid out as dividends may be taken as a deduction from pretax income. Oddly, this does not cut the 33 percent statutory rate in half, but reduces it to 19.8 percent. The reason is somewhat complicated, and has to do with the fact that part of each dollar earmarked for dividend payout must be allocated to paying taxes and cannot be used as a deduction qualifying dividend.†

METR's calculated under the assumptions of Table 2 are presented in Table 9. It is readily apparent that the Treasury plan would raise the effective tax rate on corporations with assets under $1 million. Corporations with assets in excess of $1 million would experience little change in their METR in the 'full dividend payout' case, and a rise in effective tax rates in the 'no dividend payout' case.

†To state this proposition precisely, a dollar earmarked for dividend payout gives rise to a deduction of .5(1-t), where t is the tax ultimately paid on the dollar. The tax t equals t(1-.5(1-t)), where t is the tax rate (33 percent). Since the effective tax rate e equals t/1, e = t/(2-t) = .198.
Table 9
Impact of Dividend Payout on Treasury Plan
Marginal Effective Tax Rates

<table>
<thead>
<tr>
<th>Corporations by asset size ($1000)</th>
<th>METR from Standard Model</th>
<th>Treasury METR with no Dividends</th>
<th>Treasury METR with Full Dividends</th>
<th>Treasury METR with Historical Dividends</th>
<th>METR from Generalized Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100</td>
<td>-7.3</td>
<td>33.0</td>
<td>19.8</td>
<td>27.4</td>
<td>55.3</td>
</tr>
<tr>
<td>100 to 250</td>
<td>-7.3</td>
<td>33.0</td>
<td>19.8</td>
<td>27.4</td>
<td>7.2</td>
</tr>
<tr>
<td>250 to 500</td>
<td>-6.9</td>
<td>33.0</td>
<td>19.8</td>
<td>27.4</td>
<td>13.9</td>
</tr>
<tr>
<td>500 to 1,000</td>
<td>-3.1</td>
<td>33.0</td>
<td>19.8</td>
<td>27.4</td>
<td>20.0</td>
</tr>
<tr>
<td>1,000 to 5,000</td>
<td>20.2</td>
<td>33.0</td>
<td>19.8</td>
<td>27.4</td>
<td>31.6</td>
</tr>
<tr>
<td>5,000 to 10,000</td>
<td>21.0</td>
<td>33.0</td>
<td>19.8</td>
<td>27.4</td>
<td>29.9</td>
</tr>
<tr>
<td>10,000 to 25,000</td>
<td>21.0</td>
<td>33.0</td>
<td>19.8</td>
<td>24.2</td>
<td>29.6</td>
</tr>
<tr>
<td>25,000 to 50,000</td>
<td>21.0</td>
<td>33.0</td>
<td>19.8</td>
<td>24.2</td>
<td>26.8</td>
</tr>
<tr>
<td>50,000 to 100,000</td>
<td>21.0</td>
<td>33.0</td>
<td>19.8</td>
<td>24.2</td>
<td>26.9</td>
</tr>
<tr>
<td>100,000 to 250,000</td>
<td>21.0</td>
<td>33.0</td>
<td>19.8</td>
<td>24.2</td>
<td>24.2</td>
</tr>
<tr>
<td>over 250,000</td>
<td>21.0</td>
<td>33.0</td>
<td>19.8</td>
<td>24.2</td>
<td>15.3</td>
</tr>
</tbody>
</table>

Note: small = less than $1 million in assets, medium= assets between $1 million and $25 million, large = more than $25 million in assets.
These comparisons indicate that the Treasury plan is not favorable to the smallest corporation, given the 'standard' assumptions of Table 2. Indeed, these comparisons may actually understate the adverse impact of this Treasury plan, because small corporations typically have lower dividend payout ratios. This has the effect of assigning more weight to the 33 percent METR than to the 19.8 percent METR.

The size of the dividend effect is hard to measure, since the IRS does not include dividends paid as data in the Corporation Source Book. However, some evidence on the propensity to pay dividends can be obtained from the 1984 The State of Small Business in Table A3.17. The SBA provides estimates of dividends paid by two size categories of corporation: those with assets less than $10 million, and with assets larger than this amount. For the years 1977-1980, the smaller corporations exhibit an average dividend payout rate of 42.3 percent, while the larger corporations exhibit a rate of 66.5 percent.

The fourth column of Table 9 presents METR's calculated using dividend payout rate's as weights. As can be expected, the smallest corporations now have heavier tax burdens than their larger counterparts.

This result must be interpreted with caution. The dividend payout ratio is, after all, a variable which a company can control. A company can choose to limit its effective tax rate to 19.8 percent by full

*METR for small corporations is (.423 x .198) + (.577 x .33), for larger corporations, the METR is (.665 x .198) + (.335 x .33).
dividend payout. Effective tax rates in excess of this presumably reflect the decision to retain profits despite the higher tax burden. Although this is true, it is only part of the story. Smaller corporations apparently have limited access to financial markets relative to larger firms, and so place a higher value on retained profits. This higher value might justify retention of profit in spite of higher tax burdens, but it should be recognized that the Treasury's dividend relief would penalize this decision.

Beyond this, when dividends are paid out to individual shareholders, they are usually taxed again under the individual income tax at full statutory rates. (We disregard intracorporate dividend flows). Retained profits do not qualify for dividend relief, but are ultimately subject to individual taxation as realized capital gains. If so, they are taxed at preferential rates under current law but at full (although deferred) rates under the Treasury proposal. The decision to pay dividends is seen as a decision to shift tax liability from the corporate level to the individual level. See Hulten [1985], Table 4 for additional details on combined corporate and individual taxation under current law and the Treasury proposal.

This analysis of the Treasury tax reform plan has been based on the 'standard' assumptions of Table 2. As we have seen, a change in the assumptions can alter the analysis dramatically, so we now reconsider the Treasury plan change when (1) the discount rate is allowed to vary by firm size, (2) the composition of assets is allowed to vary, and (3) the 'leverage effect' is taken into account.
The result is somewhat surprising. The Treasury METR's in columns 2, 3, and 4 of Table 9 are not affected by the change in any of these assumptions. First, because the Treasury proposal would base depreciation allowances on economic depreciation (and thus tax economic income), the effective tax rate equals the statutory rate at all rates of discount. Therefore, variations in the rate of discount do not affect the 33 percent or 19.8 percent rates shown in Table 10.

Second, the effective tax rate equals the statutory tax rate of 33 percent or 19.8 percent for each type of asset. The composition of assets by size of firm therefore does not matter.

Third, the leverage effect is based on the differential value of the interest deduction for small and large corporations: under current law the value of the interest deduction is forty-six cents on the dollar for large corporations and seventeen cents for small corporations. Under the Treasury plan, the graduated rate structure is abolished, and the value of interest deductions is the same for all corporations. Indeed, column 4 of Table 9 suggests that the leverage effect might even work in favor of small corporations.

We assume that the equilibrium leverage effect is zero for all corporations. In this case, the relevant comparison is between the 'generalized' METR and columns 2, 3, 4 of Table 9. It appears that the Treasury plan actually removes (or, at least, does not exacerbate) the tax disadvantages that some midsized corporations face.

In sum, the ultimate impact of the Treasury plan depends on the
circumstances of the small corporation. If small firms are like their larger counterparts, then their current tax advantages would be eliminated by the Treasury proposal. If, on the other hand, the differences explored in this report are real and are taken into account, one would conclude that many small and midsized corporations experience a tax disadvantage under current law, and that this disadvantage is reduced or eliminated by the Treasury plan.
V Conclusion

This report has arrived at the following policy-related conclusions.

- The conventional way of measuring the marginal effective tax rate faced by corporations of different sizes implies that small corporations are taxed more lightly than large ones.

- The conventional model does not take into account important differences between small and large corporations.

- When some of these differences are accounted for, the conclusion derived from the standard approach may be reversed: small corporations may have higher effective tax rates than generally realized.

- The impact of the Treasury tax reform proposal depends on which view of small corporations one adopts: under the conventional view, the Treasury plan erases the current tax advantage enjoyed by small corporations; under the view advanced in this report, the Treasury plan makes level the disadvantages currently faced by many such businesses.

Some small corporations may actually fit the standard assumption. Others may fit one or more of the alternative 'non-standard' assumptions. In this case, the Treasury plan will have no uniform impact on small corporate business.

Why do differences in the marginal effective tax rate matter? They matter because the effective allocation of resources requires that capital earn the same marginal social rate of return in all uses. The social rate of return, when adjusted for risk, is, by definition, equal to the after-tax rate of return plus the marginal rate of taxation. Since the after-tax rate of return tends to equilibrate, differences in the marginal effective rate of taxation will cause the social rate of return to differ across assets. The higher the effective tax rate, the larger is the social rate of return and the greater the benefit of additional investment. A higher than average marginal tax rate thus
signals too little investment in the highly taxed use.

Viewed from this perspective, it matters greatly whether small business faces higher or lower effective tax rates than large business. If one adopts the 'standard' perspective, one would conclude that some small businesses have too much capital. What we have done in this report is to open up the possibility that some small business may in fact, have too little capital as a result of the tax code.*

It is important to understand that our results do not 'prove' that small corporations are more heavily taxed than their larger counterparts. Our generalization of the standard marginal tax rate model still contains many simplifying and possibly unrealistic assumptions. For example, we assume that corporations of all sizes are subject to taxation and have sufficient income to absorb all deductions and credits.

Moreover, the IRS data used to characterize the relative tax circumstances of small and large corporations are not entirely suitable for this purpose. For example, we have had to adjust these data to reflect economic rather than tax or financial concepts of income and asset values. Furthermore, our data reveal average rather than marginal behavior. Despite these shortcomings, IRS data do provide a reasonable starting point for describing the magnitude of the effects uncovered in this report.

*This possibility exists even though after-tax rates of return differ by firm size, implying that equal effective tax rates do not necessarily imply equal social rates of return.
A. INTRODUCTION

The "user cost of capital" refers to the cost of using one unit of capital for one unit of time. The user cost concept was developed by Jorgenson [1963, 1965] in the context of explaining investment behavior, and the application of the cost-of-capital model to tax analysis was developed by Hall and Jorgenson [1967, 1971]. This framework has been used in a number of studies to calculate the marginal effective corporate tax rate associated with various methods of depreciation, various levels of the investment tax credit (ITC), and with variations in the statutory rate of taxation (e.g., Auerbach and Jorgenson [1980], Bradford and Fullerton [1981], Hall [1981], Hulten and Wykoff [1981b], Jorgenson and Sullivan [1981], The Economic Report of the President [1982], Fullerton and Henderson [1982], Gravelle [1980, 1982], Hulten and Robertson [1982], and King and Fullerton [1983], Hulten [1983]).

The cost-of-capital is described graphically by Figure 1. The gross-of-tax rate of return per dollar of capital is represented by the line $D$. This line is determined by subtracting the rate of depreciation, $\delta$, from the value of the marginal product of capital (VMP). Under the assumption of diminishing marginal returns to capital, $D$ falls as the desired stock, $K$, increases. The line $S$ represents the after-tax return to capital. It is assumed to be horizontal, implying a perfectly elastic supply of capital to a given use at a prevailing real after-tax rate of return. In the absence of taxes, the equilibrium level of capital stock, $K^*$, is determined by the intersection of $D$ and $S$—that is, by the balance of return generated by the marginal project and the return required by investors.

![Figure 1](image-url)
When capital income is taxed at a positive effective marginal rate, a wedge is driven between the VMP (less \( \delta \)) and the return accruing to the investor. Equilibrium occurs at a point \( K' \) when \( \text{VMP} - \delta \) less the tax wedge equals the after-tax return required by the investors. The total before-tax income accruing to the stock \( K' \) is given by the rectangle \( h'aK'O \) in Figure 1, and the income accruing to investors is \( FbK'O \). The effective tax rate is then the ratio of \( h'abF \) to \( h'aK'O \).

Deductions and credits can be sufficiently generous that the after-tax rate of return exceeds the before-tax rate of return. In Figure 1, this is represented by the case where the equilibrium stock, \( K'' \), lies to the right of \( K^* \), and where \( \text{VMP} - \delta \) is below \( F \). It is evident that this case implies a negative effective tax rate.
B. THE COST-OF-CAPITAL MODEL

The cost-of-capital approach to Figure 1 provides a "forward looking" estimate of the effective tax rate. This approach is based on the assumption that firms demand units of capital up to the point when the VMP of the last unit is equal to the user cost (implicit or explicit, in the case of rental capital) on that unit. Profit maximization in the market for tangible capital requires that the cost of an asset, \( q_0 \), be equal in equilibrium to the present value of the annual user costs, \( c_0 \), net of all tax provisions and adjusted for economic depreciation. For an equity financed asset, this implies

\[
q_p = \int_0^\infty e^{-(\delta + \tau)s} (1-u)c_0 \, ds + u \int_0^T e^{-(\delta + \tau)s} D(s)q_0 \, ds + k q_0,
\]

where \( u \) is the statutory marginal tax rate, \( D(s) \) denotes the tax depreciation deduction on one dollar's investment \( s \) years in the future, \( T \) is the tax life over which the investment is written off, and \( k \) is the rate of the investment tax credit. Furthermore, because tax depreciation allowances are based on the original cost of the asset, \( q_0 \), a nominal rate of return is used in discounting \( D(s) \). The nominal after-tax discount rate is the real after-tax rate \( \tau \) plus the expected rate of inflation, \( \rho \).

To account for the effect of leveraged finance at a market rate of interest, (1) can be extended to include the relevant parameters of a level payment mortgage: the fraction of the total project cost \( q_0 \) financed by debt, \( \theta \); the rate of interest on the mortgage, \( i \); and the length of the mortgage, \( M \). The introduction of these parameters results in

\[
(1-\theta)q_0 = \int_0^\infty e^{-(\delta + \tau)s} (1-u)c_0 \, ds + u \int_0^T e^{-(\delta + \tau)s} D(s)q_0 \, ds + k q_0
\]

\[
- (1-u)P \int_0^M e^{-Rs} \, ds - u \int_0^M P e^{-i(M-s)} e^{-Rs} \, ds,
\]

where \( P \) is the annual level payment on a loan of \( q_0 \) dollars. Analytically,

\[
P = \frac{i}{1-e^{-iM}} \theta q_0
\]

4. Because the user costs in the first term in the right-hand side of (1) are assumed constant at the current value \( c_0 \), a real rate of discount is used in that term.
for a level payment mortgage. The left-hand side of (2) represents the equity value of the project, and this is equal, in equilibrium, to the present value of the user costs and depreciation allowances as well as cost of the level mortgage payments adjusted for the fact that interest payments (but not principal repayments) are tax deductible.\textsuperscript{2}

Equation (2) may be inverted to yield an explicit expression for the user cost of capital:

\[
\frac{c}{q} = \frac{1 - \left(1 - \frac{k}{l} \right) uz - k - \lambda \theta}{l - u} \left( r + \delta \right),
\]

where \( \lambda = (1 - \lambda') \), and

\[
\lambda' = (1 - u) \left( \frac{1}{r} \frac{1 - e^{-rM}}{1 - e^{-IM}} + \frac{u ie^{-IM} (e^{(1-r)M} - 1)}{\left(1 - e^{-IM}\right)} \right)
\]

where \( z \) is the present value of tax depreciation deductions on one dollar's worth of asset:

\[
z = \int_0^T e^{-(\bar{r} + \rho)D(s)} ds.
\]

Note that when an asset is financed by equity, i.e. when \( \theta = 0 \), the interest deductibility term \( \lambda \theta \) drops out of the analysis. It also turns out that when \( r = (1 - u) i \), \( \lambda = 0 \) and the means of finance is again irrelevant. This is the case termed "Modified Fisher's Law" by Bradford [1981].

The effective marginal tax rate can be obtained by defining the "before-tax" or "hurdle" rate of return \( h \). This rate corresponds to \( h' \) (and \( h'' \)) in Figure 1, and is defined analytically by

\[
\frac{c}{q} = h + \delta = \frac{1 - uz - k - \lambda \theta}{l - u} (r + \delta),
\]

\textsuperscript{2} The third term on the right-hand side of (2) is the cost of level payments on the mortgage. The term \( l - u \) implies that the whole cost of the level payment is tax deductible. Since this is not the case, the fourth term is added to subtract out the principal repayments, multiplied by the tax rate, since they are not tax deductible.
The effective tax rate (ETR) is then defined as

\[ u^* = \frac{h - \delta}{h} \]

This corresponds to the ratio \( h'_{ab} \) to \( h'_{ak} \) in Figure 1.

This description refers to the taxation of a single asset. When calculating an ETR for a firm or industry, the diversity of assets must be taken into account. For example, a firm may use two types of equipment, each of which has a different tax life, a building which has yet another tax life, and inventories and land which are not depreciable at all. The composite ETR must then be obtained by aggregating the individual assets. This aggregation is typically done in two steps. First, each asset type for which an estimate of economic depreciation can be obtained is mapped into one of the five ACRS recovery classes (in the case of pre-ERTA law, this mapping is much more complicated since it involves Asset Depreciation Range classes for equipment and Guideline classes for structures). Such a map has been developed by Hulten and Robertson [1982], and others, for current law and for pre-ERTA law.

Second, since the individual \( z \) and \( k \) parameters have been estimated for each type of assets, the results must be aggregated to the all-firm (or all-industry) level using weights based on the Capital Transaction Matrix (CTM) published by the Bureau of Economic Analysis. As Gravelle [1983] notes, the weights can be obtained in several ways. The methods to be used in the proposed research are discussed below.

The resulting composite ETR will vary across firms and industries according to the mix of assets. Industries with a higher proportion of inventories will, for example, have a higher ETR than industries with a higher proportion of depreciable assets. Variation can also be introduced by allowing for different rates of return and debt-equity ratios across industries. Finally, although the model usually bases \( z \) and \( k \) on the most favorable provisions allowed taxpayers, depreciation allowance can be made to reflect actual practice by using data from the various Treasury surveys. The resulting \( z \)'s would then be a weighted average of the \( z \)'s based on actual experience.

Three further comments about the cost-of-capital model are in order. First, the model as described above assumes that sufficient income exists to absorb all credits and deductions. This is clearly not the case for many firms. Unfortunately, it is extremely difficult to capture the carryover of credit and deductions from period to period because the effect on the present value (2) will depend on the time at which the firm in question expects to be profitable. However, in some cases it may be
possible to calculate the average time lag before the deductions and credits become effective (e.g., $T^*$) and adjust the present value (2) by a discount factor $(1/(1+r))^{T^*}$ to reflect the latter average starting date of the credits and deductions.

Second, the cost-of-capital framework has generally been applied to the corporate tax alone. Thus ignores the interaction with the personal income tax (see Hulten [1983] and King and Fullerton [1983] for exceptions). This treatment can be justified by the fact that we are often interested in how the corporate tax structure impacts differentially on corporations. However, this narrow focus is not a necessary aspect of the model. The nominal tax rate $u$ can be made to reflect the joint marginal impact of the corporation income tax, along the lines suggested by Feldstein and Summers [1979].

Finally, it is important to note that the cost-of-capital model does not capture all the provisions of the Tax Code affecting corporate income. Indeed, most of the complexity is ignored. However, the focus of the model is on the main policy parameters which have been changed over time: $u$, $z$, and $k$. These parameters, when adjusted for the interest deductibility affect, and for asset mix, account for much of the change in the average corporate ETR over time. Hulten and Robertson [1982] find that changes in $u$, $z$, and $k$ have had the effect of reducing the corporate ETR by an average of one percent a year over the 1953-1980 period.
C. SPECIFICATION OF THE MODEL

The model developed in the preceding section was used to calculate METRs by type of asset. Table A.1 gives key parameter values used in the calculation in all variants of the analysis. Other key parameters vary by case or by size or corporation. The key financial parameters and rates of return are shown in Table 9.

The rate of inflation was computed so that \( X = 0 \) for the largest corporation; in other words, \( \rho = (1-u)i - r \). This \( \rho \) varies as \( r \) varies from case to case. The interest rate \( \lambda \) is always the average Moody Aa for the years 1977-1980. An alternative value of \( \rho \) was obtained by averaging the GNP deflation for the years 1977-1980; METRs based on this value are shown in appendix tables.

When the rate of discount was held constant at 4%, the Moody Aa rate was assumed to apply to all size classes. When \( r \) varies, we introduce size variation in \( i \). We do this by calculating the ratio of total IRS interest paid to IRS debt for the years 1963-1965. These early years were selected because the rate of inflation was relatively low and IRS book value of debt may, therefore, be taken to be relatively close to market value. With the high rate of inflation in the 1970s, the market value of old debt fell dramatically; if the age structure of debt varies across size classes, the ratio of interest payments to book value of debt can result in a seriously misleading estimate of the average rate of interest faced by corporations of different sizes.

The procedure resulted in the following variation by size of corporation (the largest size class = 1.00):

<table>
<thead>
<tr>
<th>Size Class</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100*</td>
<td>1.117</td>
</tr>
<tr>
<td>100 to 250</td>
<td>1.414</td>
</tr>
<tr>
<td>250 to 500</td>
<td>1.429</td>
</tr>
<tr>
<td>500 to 1,000</td>
<td>1.363</td>
</tr>
<tr>
<td>1,000 to 5,000</td>
<td>1.394</td>
</tr>
<tr>
<td>5,000 to 10,000</td>
<td>1.395</td>
</tr>
</tbody>
</table>

*(in $1000)

D. SPECIAL IMPUTATIONS

Because IRS data reflects book value rather than market values, we adjusted the IRS depreciable asset figures with data from the Natural Income and Product Accounts (NIPA). The market valuation adjustment is derived from NIPA current and constant dollar investment in structures and producers durable equipment from tables 5.4, 5.5, 5.6, and 5.7. The market value of each of the types of structures and equipment is derived by cumulating the constant dollar investment assuming geometric depreciation at rates taken from Hulten and Wykoff into a constant dollar stock series from 1928 to 1983. The constant dollar stock net of depreciation is multiplied by the investment deflator to get a current market value stock series. The stock series is benchmarked at 1929 at
Table A.1
PARAMETER VALUES USED IN THE COMPUTATION OF EFFECTIVE TAX RATES

<table>
<thead>
<tr>
<th></th>
<th>3-Year</th>
<th>5-Year</th>
<th>10-Year</th>
<th>15-Year</th>
<th>18-Year</th>
<th>Inventory Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of Economic Depreciation</td>
<td>33%</td>
<td>15%</td>
<td>7%</td>
<td>5%</td>
<td>3%</td>
<td>0</td>
</tr>
<tr>
<td>Rate of the Investment Tax Credit</td>
<td>6%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Maturity of Debt</td>
<td>15 yr.</td>
<td>15 yr.</td>
<td>15 yr.</td>
<td>15 yr.</td>
<td>15 yr.</td>
<td>15 yr.</td>
</tr>
<tr>
<td>Aggregation Weight</td>
<td>4.5%</td>
<td>29.3%</td>
<td>0.1%</td>
<td>3.6%</td>
<td>40.7%</td>
<td>21.9%</td>
</tr>
</tbody>
</table>
1/(2*DELTA) times the average constant dollar investment for the three years 1930-1930 where DELTA is the geometric retirement rate for each asset type.

Weights for each asset type for each industry are derived from 1976 investment values from the Department of the Treasury. These weights are applied for the years 1977-80 to derive a total market to book value adjustment for depreciable assets for each IRS division. The average book to market ratio for 1977-80 for the 9 divisions is as follows:

- Agriculture: .5926
- Mining: .5077
- Construction: .6978
- Manufacturing: .6250
- Transportation, Utility: .5982
- Trade: .5882
- Finance-Real Estate: .4928
- Services: .5174

This adjustment can only be viewed as approximate, since IRS industries are company based and NIPA industries are establishment based. Furthermore, we were only able to adjust depreciable assets to reflect market value.

Since we revalued the assets to reflect economic concepts, we also adjusted IRS income measures. We distributed the NIPA capital consumption adjustment (Table 8.9) in proportion to IRS tax depreciation allowances; thus adjustment is intended to convert the IRS tax measure to economic depreciation. We also distributed the NIPA industry valuation adjustment in proportion to IRS investments to remove inflationary inventory profit.


Feldstein, Martin, and Lawrence Summers [1979], "Inflation and the Taxation of Capital Income in the Corporate Sector," National Tax Journal, 32, December.


