5 INVESTMENT INCENTIVES UNDER THE TAX REFORM ACT OF 1986

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I. INTRODUCTION

The Tax Reform Act of 1986 significantly changes the taxation of income from tangible capital. It lowers the top statutory marginal corporate income tax rate from 46 percent to 34 percent. It also lowers income tax rates on interest income, noncorporate business income, and dividends. In contrast, however, tax reform eliminates the 60 percent exclusion on long term capital gains. Thus, the effective rate on capital gains is increased by tax reform. In addition, tax reform alters capital cost recovery provisions, perhaps most dramatically by repeal of the investment tax credit, and it improves the matching of income and expense in accounting for multi-period production.

These changes in capital income taxation can affect marginal investment incentives in complicated ways. Rate reduction can, for example, partially offset changes in recovery allowances. Furthermore, different assets, industries, and sectors are likely to be affected differently. In order to capture the effect of simultaneous changes in corporate rates, individual rates, and recovery allowances, we measure investment incentives using a cost of capital framework. The cost of capital provides a comprehensive, forward looking measure of marginal investment incentives. It is the pre-tax return on a marginal investment needed to earn a given net of tax return, and captures the effects of depreciation, credits, and statutory rates. In addition, the standard cost of capital model can be adapted to include the effects of accounting rules for multi-period production. Finally, costs of capital for individual assets can be weighted together to obtain measures of investment incentives for more aggregate assets (equipment vs. structures), industries,

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and sectors, as well as to obtain overall economy wide measures of investment incentives.

We find that tax reform generally reduces investment incentives. Our analysis further indicates, however, that tax reform has been successful in "leveling the playing field." Regardless of its effect on overall investment and savings incentives, tax reform reduces the disparity in the taxation of alternative assets and investors. Thus, investment choices will be more efficient. Our analysis also shows that there is no unique set of effective tax rates (or costs of capital) associated with either prior law or tax reform. Instead, magnitudes and sometimes even signs depend on parameter values and modeling choices. Under some scenarios tax reform lowers overall effective tax rates. We also find that modeling accounting rules has only a small effect on the magnitude of our results.

In this paper we do not consider the ultimate effect of tax reform on the allocation of resources. Rather, we simply measure its effect on incentives to change the allocation of capital, incentives which will eventually affect resource allocation in general. A comprehensive analysis of the effect of the capital taxation provisions of tax reform on the allocation of resources is provided in this volume by Fullerton, Henderson and Mackie (1987). They use the computable general equilibrium model developed by Fullerton and Henderson (1986) to analyze the effect of changes in capital taxation on growth, resource allocation, and welfare.

The remainder of our paper is organized as follows. Section II briefly describes the cost of capital model. Section III describes the data we use to implement our analysis. In particular, in the third section we describe a very disaggregate capital stock which allows us to consider great detail in measuring and weighting reform induced changes in the taxation of different assets. Sections IV-VII present our results, including sensitivity analyses. In Section VIII we model accounting rules. We conclude in Section IX with a summary of our findings and suggestions for future work.

II. THE MODEL OF INVESTMENT INCENTIVES

We use the model developed in Fullerton (1987) and Fullerton and Henderson (1984) to measure investment incentives. Their model abstracts from issues related to risk, and is based in turn on the neo-classical rental rate approach of Hall and Jorgenson (1967). It captures the effects of personal and corporate income taxes and property taxes at the federal, state, and local levels, as well as depreciation allowances, and credits.[1]

A. The Discount Rate, Personal Taxes, and Arbitrage

In calculating the discount rate, r, we follow Fullerton and Henderson (1984) and consider two alternative arbitrage scenarios. The first scenario is

individual arbitrage, which requires that all ultimate savers earn the same after all tax return, s, on investments in all sectors (corporate, noncorporate business, and owner-occupied housing). Savers (investors) trade off between debt and other investments until the net of all tax return on all investment equals the net of all tax return on debt:

$$s = s_c = s_{nc} = s_h = i(1-\tau_d)-\pi \tag{5.1}$$

where s_c, s_{nc}, and s_h are the net returns to ultimate savers for investment in the corporate, noncorporate, and owner-occupied housing sectors, respectively, i is the nominal interest rate, τ_d is the tax rate on interest income, and π is the inflation rate.

The after all tax return to savers, s, and the inflation rate, π, are specified exogenously, and (once τ_d is specified below) equation (5.1) is used to solve for the interest rate. The discount rate for each sector can then be determined as a function of the interest rate, personal tax parameters, and financing shares.

Corporations can finance real investment by new debt, retained earnings, or new share issues. Corporate debt financed investment in real capital must earn the after-tax interest cost, i(1-u), where u is the statutory marginal tax rate on corporate income. Corporate investment financed by retentions must earn a return r such that ultimate savers are indifferent between interest payments and the capital gains such re-investment will yield: $r(1-\tau_{re})$ must equal $i(1-\tau_d)$, where τ_{re} is the personal tax on accrued capital gains. Similarly, new share issues must earn a return such that investors are indifferent between interest payments and dividends: $r(1-\tau_{ns})$ must equal $i(1-\tau_d)$ where τ_{ns} is the personal tax on dividends. The corporate nominal discount rate is a weighted average of the three discount rates:

$$c_d\left[i(1-u)\right] + c_{re}\left[\frac{i(1-\tau_d)}{(1-\tau_{re})}\right] + c_{ns}\left[\frac{i(1-\tau_d)}{(1-\tau_{ns})}\right] \tag{5.2}$$

where c_d, c_{re}, c_{ns}, are the fractions of corporate investment financed by debt, retentions, and new shares, respectively.

Similarly, noncorporate firms have an after-tax interest cost of $i(1-\tau_{nc})$, and their equity must earn $i(1-\tau_d)$ after taxes where τ_{nc} is the tax rate on noncorporate business income. Thus, the overall discount rate for the noncorporate firm is

$$n_d[i(1-\tau_{nc})]+n_e[i(1-\tau_d)] \tag{5.3}$$

where n_d, and n_e are the fractions of noncorporate investment financed by debt and equity, respectively. Identical logic gives

$$h_d[i(1-\tau_h)]+h_e[i(1-\tau_d)] \tag{5.4}$$

as the discount rate for owner-occupied housing, where h_d and h_e are the fraction of investment in owner-occupied housing financed by debt and equity, respectively and τ_h is the income tax rate at which homeowners deduct interest payments.

With individual arbitrage, ultimate investors earn the same after-tax real return on all investments. However, firms earn different returns on debt financed than on equity financed investment. As an alternative, we consider arbitrage between debt and real capital at the firm level. Under this alternative assumption, net-of-tax returns are equated for the firm, and so the firm uses the cost of debt, i(1-u), as the discount rate for all investments, regardless of the actual source of finance. In this case, however, net-of-tax returns differ for ultimate savers depending on whether the investment is in the corporate business, noncorporate business, or owner-occupied housing sector.[2] In a perfect certainty model such as this, either firm or individual arbitrage is possible, but not both at the same time. Thus, we report results for each alternative arbitrage assumption.

B. Cost of Capital and Effective Tax Rate

The neo-classical approach exploits the competitive profit maximizing condition that the marginal investment will yield a cash flow whose present value is just sufficient to cover its acquisition price. This equilibrium condition is solved for the social return on investment, gross of tax but net of economic depreciation, which equals the marginal product of capital, and is referred to as the (financial) cost of capital. For a corporate firm the cost of capital on a marginal investment of \$1, ρ^c, may be written as

$$\rho^c = \{(r-\pi+\delta)/(1-u)\}(1-k-auz)+w-\delta \qquad (5.5)$$

where r is the nominal discount rate for corporate investment (as determined above), π is the constant rate of inflation, δ is the constant rate of economic depreciation, u is the statutory rate on income generated by the marginal corporate investment, k is the rate of investment tax credit, z is the present value of tax depreciation allowances on \$1 of depreciable basis, a is the percentage of basis entitled to statutory depreciation, and w is the local property tax rate. The discount rate, inflation rate, and statutory corporate income tax rate are constant across assets in the corporate sector. However, the other parameters (k, z, w, and δ) vary by asset. The cost of capital for noncorporate investment may be written as in (5.5) by replacing u with τ_{nc}, the personal tax rate on noncorporate business income, and using the appropriate noncorporate discount rate.[3]

We also measure incentives for investment in owner-occupied housing. Such investment is entitled to neither an investment tax credit nor capital recovery allowances. However, the rents generated by the investment are not taxed, while property taxes are deductible. The cost of capital for investment

in owner-occupied housing may be written as

$$\rho^{h} = r - \pi + (1 - \lambda\tau_{h})w \qquad (5.6)$$

where τ_h is the tax rate at which home owners deduct property taxes and λ is the fraction of property taxes deducted.

Many of our results are shown using the cost of capital. However, we also present results based on effective tax rates. The effective tax rate, t, is defined as the difference between the cost of capital (i.e. the real pre-tax return), ρ, and the required real after tax return on investment, s, as a percentage of the cost of capital: $t = (\rho - s)/\rho$. In some cases, the effective tax rate is more easily interpreted than is the cost of capital.[4] The effective tax rate shows the total proportion of capital costs attributable to taxes at both the personal and corporate levels and can be compared with statutory rates.

III. DATA AND PARAMETERS

Our analysis considers the tax treatment of many depreciable assets, plus nondepreciable land and inventories, used in the corporate and in the non-corporate sectors of each of 60 private industries, as well as structures and land in an owner-occupied housing sector. In order to compute each asset's cost of capital and effective tax rate we must specify an economic depreciation rate as well as the relevant tax parameters and financing shares. To calculate summary measures of incentives by industry and sector, as well as measures of overall economy wide investment incentives, we need a set of weights. We first describe in Part A the detailed capital stock data we use as weights for our summary measures. Part A also discusses our assumptions on economic depreciation. Next, we describe our determination of the parameters which are affected by tax reform: capital cost recovery allowances in Part B and statutory income tax rates in Part C. We conclude with an explanation of our determination of parameters which do not change as a consequence of tax reform: financing shares in Part D and property taxes in Part E.

A. Asset Definition, Capital Stock Weights, and Economic Depreciation

Earlier studies (Auerbach (1983a), Fullerton (1987), Fullerton and Henderson (1984), Gravelle (1982)) typically consider the 34 types of depreciable property shown in Table 5.1. The most detailed of these (Fullerton (1987) and Fullerton and Henderson (1984)) compute the cost of capital for each asset for both corporate and noncorporate firms, as well as for owner-occupied housing. These disaggregate costs of capital are then weighted to obtain summary measures of investment incentives in the corporate sector, the noncorporate business sector, and for the economy as a whole.[5]

Table 5.1 **Cost Recovery Periods in Fullerton (1987)**

	Prior Law Recovery Period
1. Furniture and Fixtures	5
2. Fabricated Metal Products	5
3. Engines and Turbines	5
4. Tractors	5
5. Agricultural Machinery	5
6. Construction Machinery	5
7. Mining and Oil Field Machinery	5
8. Metalworking Machinery	5
9. Special Industry Machinery	5
10. General Industrial Equipment	5
11. Office and Computing Machinery	5
12. Service Industry Machinery	5
13. Electrical Machinery	5
14. Trucks, Buses, and Trailers	5
15. Autos	3
16. Aircraft	5
17. Ships and Boats	5
18. Railroad Equipment	5
19. Instruments	5
20. Other Equipment	5
21. Industrial Buildings	19
22. Commercial Buildings	19
23. Religious Buildings	19
24. Educational Buildings	19
25. Hospital Buildings	19
26. Other Nonfarm Buildings	19
27. Railroads	15
28. Telephone and Telegraph	15
29. Electric Light and Power	15
30. Gas Facilities	10
31. Other Public Utilities	10
32. Farm Structures	19
33. Mining, Shafts and Wells	5
34. Other Nonbuilding Facilities	19

Source: Fullerton (1987)

Although these studies incorporate much disaggregation, in at least two respects they over-simplify the tax treatment of different assets. First, the 34 assets in Table 5.1 are themselves composed of more disaggregate components which may not receive uniform cost recovery allowances. Second, and relatedly, these earlier studies did not allow for the industry specific determination of cost recovery allowances. Instead, they gave each asset the same tax treatment in all industries. However, both prior law and the Tax Reform Act of 1986 are based on the Asset Depreciation Range system (ADR) which classifies some types of personal property on an industry basis. We build on earlier work by using a more disaggregate set of assets and by allowing for industry specific cost recovery allowances.

We begin our analysis with 50 types of nonresidential and 11 types of residential depreciable property used in 60 different private industries, as tracked by the Bureau of Economic Analysis (BEA). Table 5.2 lists the 50 depreciable nonresidential BEA assets. Asset number 51, residential structures, in Table 5.2 is an amalgamation of the 11 types of BEA residential rental assets. Based on unpublished BEA data, we divide investment flows in each asset in each industry into a corporate and a noncorporate component. Next, we use an algorithm developed by the Joint Committee on Taxation (JCT) and the Office of Tax Analysis (OTA) to further disaggregate investment in each of the 61 BEA assets in each sector of each industry into components based on ADR midpoint lives.[6] For example, investment in BEA asset number 20, trucks, buses, and truck trailers (whose ADR classification does not vary by industry) is disaggregated into its components: buses, with an ADR midpoint of 9 years; light general purpose trucks, with an ADR midpoint of 4 years; heavy general purpose trucks, with an ADR midpoint of 6 years; over the road tractor units, with a 4 year ADR midpoint; and trailers and trailer mounted containers with a 6 year ADR midpoint. In addition, the algorithm assigns industry specific ADR midpoints where appropriate. For example, under the ADR system, most personal property used in the mining industry has an ADR midpoint of 10 years, while if used in the construction industry the same property would have a midpoint of 6 years. The algorithm takes this into account and, for instance, assigns BEA asset number 7, construction tractors, a 10 year ADR midpoint in the coal mining industry, but a 6 year ADR midpoint in the construction industry.

After computing the cost of capital for each component of each asset in each industry based on ADR life, we wish to aggregate up so that our results are more accessible. This requires a set of weights. Two common weights are investment flows (see, for example the International Trade Commission (1986)) and capital stocks. We follow Fullerton (1987) and Fullerton and Henderson (1984) in using capital stock weights. Fundamentally, we are concerned with the size of the capital stock and its allocation across different assets and sectors. Investment is important, but primarily as the means through which changes in the stock of capital are realized. Thus, a marginal change in our analysis is a proportional expansion of the existing capital stock. Therefore

Table 5.2 Cost Recovery Parameters in the Corporate Sector

Asset	Economic Depreciation Rate	Cost Recovery*		
		ITC	ACRS Recovery Period	Tax Reform Recovery Period
		ITC		
1. Furniture & Fixtures (Household)	.110	.100	5.00	5.20
2. Furniture & Fixtures (Other)	.110	.100	5.00	7.00
3. Fabricated Metal Products	.090	.100	5.40	6.49
4. Steam Engines and Turbines	.080	.100	10.67	15.30
5. Internal Combustion Engines	.076	.100	8.01	11.70
6. Farm Tractors	.161	.100	5.00	6.52
7. Construction Tractors	.163	.100	5.00	5.15
8. Other Agricultural Machinery	.097	.100	5.00	7.00
9. Other Construction Machinery	.170	.100	5.00	5.36
10. Mining And Oilfield Machinery	.168	.100	5.00	7.00
11. Metalworking Machinery	.123	.091	4.53	5.86
12. Special Industry Machinery	.102	.098	4.89	6.60
13. General Industrial Equipment	.122	.098	5.25	7.26
14. Office Computing Machinery	.273	.100	5.00	5.00
15. Service Industry Machinery	.166	.100	5.12	5.24
16. Communications Equipment	.115	.100	7.73	9.99
17. Elec. Trans., Dist., & Indus. Appar.	.081	.099	7.74	10.34
18. Electric Household Appliances	.118	.100	5.00	5.00
19. Other Electrical Equipment	.116	.100	5.00	5.23
20. Trucks, Buses and Truck Trailers	.253	.071	3.56	5.00
21. Autos	.333	.060	3.00	5.00
22. Aircraft	.183	.100	5.00	7.00
23. Ships and Boats	.075	.100	5.00	9.88
24. Railroad Equipment	.066	.100	5.00	7.00
25. Scientific & Engin. Instruments	.139	.100	6.32	7.78
26. Photographic Instruments	.146	.100	4.98	5.20
27. Other Nonresidential Equipment	.146	.100	5.00	5.32
28. Industrial Buildings	.036	.025	15.51	25.49
29. Mobile Commercial Offices	.080	.000	19.00	31.50
30. Commercial Office Buildings	.025	.000	19.00	31.50
31. Commercial Warehouses	.025	.000	19.00	31.50
32. Other Commercial Buildings	.026	.067	9.67	14.34
33. Religious Buildings	.019	.000	19.00	31.50
34. Educational Buildings	.019	.000	19.00	31.50
35. Hospital and Institut. Buildings	.023	.000	19.00	31.50
36. Hotels and Motels	.045	.000	19.00	31.50
37. Amusement and Recreational	.044	.100	10.00	13.47
38. Other Nonfarm Buildings	.045	.000	19.00	31.50
39. Railroads	.030	.100	5.00	7.00
40. Telephone and Telegraph	.032	.076	10.56	12.59
41. Electric Light and Power	.032	.100	13.00	18.00
42. Gas	.032	.057	12.71	20.22
43. Local Transit	.032	.100	5.00	5.00
44. Petroleum Pipelines	.032	.100	5.00	15.00
45. Farm	.024	.000	19.00	20.00
46. Oil & Gas Explor, Shafts & Wells	.056	.100	5.00	7.00
47. Other Mining Shafts and Wells	.056	.100	5.00	7.00
48. Other Nonresidential Structures	.029	.000	19.00	31.50
49. Railroad Replacement Track	.032	.100	5.00	7.00
50. Nuclear Fuel	.250	.100	5.00	5.00
51. Residential Structures	.036	.001	18.94	27.45

Source: Described in the text.

*These are averages weighted by capital stocks. They differ from statutory ITC allowances or recovery periods because each numerical asset may contain components with differing ITC allowances or recovery periods.

we compute the capital stock for each component of each asset used in the corporate and noncorporate sector of each industry.[7] Using these stocks as weights, we aggregate to the 50 types of nonresidential depreciable property plus residential rental property shown in Table 5.2. These capital stock weights are also used to compute summary measures of investment incentives by industry, by sector, as well as economy wide averages.

In addition to depreciable assets, we measure investment incentives for nondepreciable land and inventories. These are included in overall average measures using stock weights based on those used by Fullerton (1987).

We compute economic depreciation rates for each component of our disaggregate depreciable assets based on rates computed by Hulten and Wykoff (1981) and Jorgenson and Sullivan (1981). The weighted average rate is shown in Table 5.2 for each of the 51 depreciable assets used in the corporate sector.

B. Capital Cost Recovery: The Investment Tax Credit and Depreciation Allowances

Prior law provides a 6 percent investment tax credit (ITC) for autos, light trucks, and certain short lived special manufacturing equipment, and a 10 percent ITC for other types of equipment and for public utility property. Real property does not receive the ITC. Tax reform would eliminate the ITC for all investment.

It is apparent from the Hulten-Wykoff economic depreciation rates of Table 5.2 that different assets depreciate at very different rates. Tax law, however, tends to group assets into a limited number of depreciation classes, thus generating nonneutralities.[8] Prior law Accelerated Cost Recovery System (ACRS) groups assets into five classes. Recovery is based on historic cost, and recovery periods range from 3 to 19 years. Assets in classes 1-4 (personal property–equipment–and public utility property) receive recovery allowances based on 150 percent declining balance, with an optimal switch to straight line. Real property (class 5) receives 175 percent declining balance, with an optimal switch to straight line, over a 19 year recovery period. Depreciable basis is reduced by one-half of the ITC. Thus, in equation (5.5) a equals (1-.5k).

Using a JCT-OTA algorithm, we assign an ITC rate and an ACRS cost recovery period to each ADR component of each asset in each industry.[9] Table 5.2 shows the average ITC rate and the average ACRS recovery period for each of 51 depreciable assets in the corporate sector. These ITC rates and recovery periods can differ from statutory allowances because they are capital weighted averages of components with differing statutory allowances.

Table 5.1 shows the prior law ACRS classification of assets used by Fullerton (1987). Comparison with our classification in Table 5.2 highlights several differences. Among types of equipment (assets 1-27 of Table 5.2) we show some assets with a longer recovery period than Fullerton (1987). and some with a shorter recovery period. For example. our classification of engines

and turbines (assets 3 and 4 in Table 5.2) gives a recovery period averaging between 8 and 11 years, longer than the 5 year period used by Fullerton (1987). We give other assets, such as metal working machinery, a shorter ACRS recovery period than in Fullerton (1987). On the whole, for equipment we differ from Fullerton (1987) more often by using a longer than a shorter recovery period. This is partly due to the fact that some components of assets 1-27 of Table 5.2 are 19 year real property under ACRS, and some components are 10 year or 15 year public utility property under ACRS.

Our classification of structures indicates somewhat shorter ACRS recovery periods than those used by Fullerton (1987). Our data indicates that not all investment in industrial buildings (asset 28 in Table 5.2), for example, is treated as investment in real property for tax purposes. Instead, a portion is personal property and receives a shorter recovery period. Thus, we show an average recovery period of 15.5 years, while Fullerton (1987) treats all investment in industrial buildings as investment in real property, and consequently assigns it a 19 year recovery period.

The International Trade Commission (1986) has computed the cost of capital and effective tax rates under prior law and several reform proposals for each of the 51 assets in Table 5.2. However, their cost recovery classification is a simple mapping from Fullerton (1987). Thus, our classification captures considerably more detail than that used by the International Trade Commission. Furthermore, the Commission's analysis compares prior law with reform proposals which differed substantially from the final version of the Tax Reform Act of 1986.[10]

Tax reform expands the number of recovery classes from five to eight. Based on ADR midpoints, personal property is assigned a recovery period ranging from 3 to 20 years. Property with recovery periods of 3, 5, 7, or 10 years receives allowances based on the 200 percent declining balance method, with an optimal switch to the straight-line method. Property with recovery periods of 15 and 20 years (primarily public utility property under ACRS), receives allowances based on the 150 percent declining balance method, with an optimal switch to the straight line method. Residential real property receives straight line over 27.5 years and nonresidential real property receives straight line over 31.5 years. As under prior law, recovery allowances are based on historic cost. The average recovery period in the corporate sector for each of 51 types of depreciable property is shown in Table 5.2. In general, tax reform lengthens recover periods. However, this effect is somewhat offset for most equipment by the generous 200 percent declining balance method allowed under tax reform.

C. Corporate and Individual Income Tax Rates[11]

Under prior, or pre-tax reform law, the top federal statutory rate was 46 percent. State corporate income taxes average .066 (King and Fullerton (1984)). Deductibility of state taxes at the federal level implies an overall

statutory rate of .46+.066(1-.46), which equals .495. Tax reform lowers the top Federal statutory rate to .34. Thus, the overall corporate statutory rate for tax reform is .34+.066(1-.34), which equals .383.

Personal income taxes under prior law are based on a progressive structure composed of 14 brackets with a 50 percent maximum rate. Tax reform reduces the number of brackets to two with statutory rates of 15 and 28 percent. The top statutory rate, however, is 33 percent because a 5 percent surcharge is used to remove the benefits of the 15 percent rate and the personal exemption for high income taxpayers. Using the Treasury Individual Tax Model[12] James Cilke calculated the weighted average marginal personal income tax rates at the Federal level for interest, dividend, long-term capital gains, and non-corporate business income, as well as the rate at which households take deductions, for both prior law and tax reform. The results of these tabulations are shown in the "Federal Only" column of Table 5.3.

Tax reform generally lowers federal average marginal personal tax rates on capital income. An important exception, however, is the tax rate on realized long-term capital gains. Because 60 percent of long term gains are excluded under prior law, realized long-term gains are taxed at a maximum rate of 20 percent. Tax reform eliminates this exclusion and taxes realized long-term capital gains as ordinary income, with a maximum statutory rate of 33 percent. Thus, the average marginal rate on realized gains rises accordingly, from 16.4 percent under prior law to 26.7 percent under tax reform.

Tax reform also reduces the number of itemizers. Thus, the fraction of property taxes deducted on federal income tax returns, λ, falls from .48 under prior law to .41 under tax reform.

The personal tax rates from the Treasury Individual Tax Model are modified as in King and Fullerton (1984) to reflect taxation at the state and local level, deferral of capital gains, and the taxation of banks, life insurance companies, and nonprofit institutions.[13] The adjusted personal rates used in our cost of capital calculations are shown in the "After Adjustment" column of Table 5.3. As with the unadjusted rates, tax reform lowers the adjusted personal tax rates on all types of capital income except accrued capital gains.

Table 5.3 **Personal Tax Rates**

	Federal Only		After Adjustment	
Type of Income	Prior Law	Tax Reform	Prior Law	Tax Reform
Interest	.255	.216	.219	.194
Dividends	.329	.258	.285	.232
Capital Gains	.164	.267	.074	.125
Noncorporate	.250	.210	.300	.260
Housing Deductions	.209	.175	.259	.225

Source: Treasury Individual Tax Model, as described in the text.

D. Financing Shares

Financing shares are assumed invariant in the face of tax reform. For most calculations, we assume that firms finance marginal investments in the same way they as they financed the existing capital stock. Fullerton and Henderson (1984) cite data which suggests that noncorporate firms and homeowners finance one third of investment using debt and two thirds using equity. King and Fullerton (1984) indicate that corporations also finance using one third debt and two thirds equity. Corporate equity, in turn, is 93 percent retentions and 7 percent new share issues. Because of the small weight put on new share issues, these corporate sector financing shares are consistent with the new view of Auerbach (1979), Bradford (1981) and King (1977) that the dividend tax is not an important additional source of distortion in the allocation of investment between the corporate sector and the rest of the economy. This view of the dividend tax is controversial, and others argue that dividend payout rates affect the cost of capital, and that there is significant double taxation of corporations because profits are taxed once at the firm level and again when distributed as dividends (McLure (1979)). Therefore, we consider an alternative financing assumption which puts more weight on new share issues. Results for several additional financing arrangements also are reported below.

E. Local Property Taxes

Like capital stock weights, economic depreciation rates, state income tax rates, and financing shares, local property tax rates are assumed unchanged by tax reform. Based on Fullerton and Henderson (1984) we use economy wide averages of .008 for equipment and inventories, .011 for business land and structures, .016 for public utilities, and .018 for residential land and structures.

IV. INVESTMENT INCENTIVES BY ASSET, SECTOR, AND INDUSTRY: PRIOR LAW COMPARED WITH THE TAX REFORM ACT OF 1986

In this section we first present detailed results on investment incentives for each of 54 assets under prior law and tax reform. To keep the discussion manageable, these asset specific results are reported only for the corporate sector. Next, we report more aggregate results showing relative investment incentives for broad asset categories, as well as overall, in the corporate sector, the noncorporate sector, and the owner-occupied housing sector. Finally, we discuss marginal investment incentives for each of 60 private industries under both prior law and tax reform.

A. Present Value of Recovery Allowances by Asset

Table 5.4 shows the present value of depreciation allowances (columns 1 and 2), the present value of total cost recovery allowances under prior law (column 3), and the present value of allowances based on real economic depreciation (column 4) for each of 51 depreciable assets in the corporate sector. These calculations abstract from the effect of income tax rates on the discount rate by using a common 8 percent nominal discount rate for both prior law and tax reform. The present value of real economic depreciation is calculated using a 4 percent real rate of return.

Column 1 of Table 5.4 shows the present value of depreciation under prior law. Comparing column 1 with column 4 shows that prior law generally gives depreciation allowances more generous than allowances based on economic depreciation. This is true for both equipment (assets 1-27) as well as structures like assets (28-51).

For equipment, tax reform has a relatively small, but variable, effect on the present value of depreciation allowances, compared with those under prior law. For types of equipment such as office computing machinery (asset 14), which maintain the same recovery periods under tax reform as under prior law, but receive allowances based on the more generous 200 percent declining balance method, tax reform raises the present value of depreciation allowances. For other categories of equipment, such as construction tractors (asset 7) and photographic instruments (asset 26), the effect of the more generous method is offset partially by a longer life, and the present value of depreciation allowances rise, but by a slightly smaller amount. For other types of equipment, such as farm tractors (asset 6) and railroad equipment (asset 24), the more generous method is insufficient to offset the longer recovery period, and the present value of allowances fall. In addition, certain components of equipment-like assets (1-27) are real property (or ACRS public utility property) for which tax reform reduces the present value of allowances, as discussed below. On the whole, for equipment, tax reform reduces the present value of depreciation allowances more often than it raises the present value of depreciation allowances. However, allowances typically remain more generous than those based on economic depreciation.

In contrast to its effect on equipment, tax reform sharply reduces the present value of depreciation allowances for most structure-like assets (27-51), compared with prior law levels. This largely is due to the combination of a long recovery period for real property (raised from 19 to 27.5 years for residential real property and from 19 to 31.5 years for nonresidential real property), and the switch from the 175 percent declining balance method to the straight line method. For components of certain public utility structures (assets 40-44) the reduction in the present value of depreciation allowances also reflects the longer lives assigned to some 150 percent declining balance utility property, as well as the reclassification of some property from 150 percent declining balance over 15 years under ACRS to

Table 5.4 Present Value of Cost Recovery Allowances for Corporate Assets[a]

Assets	Present Value of Depreciation Allowances[a]		Present Value of Total Cost Recovery Allowances Under Prior Law[b]	Present Value of Economic Depreciation[b]
	Prior Law	Tax Reform		
1. Furniture & Fixtures (Household)	.846	.864	1.006	.733
2. Furniture & Fixtures (Other)	.846	.819	1.006	.733
3. Fabricated Metal Products	.837	.834	.997	.692
4. Steam Engines and Turbines	.713	.624	.879	.667
5. Internal Combustion Engines	.776	.710	.939	.655
6. Farm Tractors	.846	.831	1.006	.801
7. Construction Tractors	.846	.865	1.006	.803
8. Other Agricultural Machinery	.846	.819	1.006	.708
9. Other Construction Machinery	.846	.860	1.006	.810
10. Mining and Oilfield Machinery	.846	.820	1.006	.808
11. Metalworking Machinery	.861	.849	1.006	.755
12. Special Industry Machinery	.849	.830	1.005	.718
13. General Industrial Equipment	.841	.815	.998	.753
14. Office Computing Machinery	.846	.869	1.006	.872
15. Service Industry Machinery	.843	.863	1.003	.806
16. Communications Equipment	.784	.746	.947	.742
17. Elec. Trans., Dist., & Indus. Appar.	.784	.748	.945	.669
18. Electric Household Appliances	.846	.869	1.006	.747
19. Other Electrical Equipment	.846	.864	1.006	.744
20. Trucks, Buses and Truck Trailers	.893	.869	1.005	.863
21. Autos	.911	.869	1.005	.893
22. Aircraft	.846	.819	1.006	.821
23. Ships & Boats	.846	.756	1.006	.652
24. Railroad Equipment	.846	.819	1.006	.623
25. Scientific & Engin. Instruments	.815	.804	.976	.777
26. Photographic Instruments	.847	.864	1.007	.785
27. Other Nonresidential Equipment	.846	.861	1.006	.785
28. Industrial Buildings	.643	.477	.685	.474
29. Mobile Commercial Offices	.575	.365	.575	.667
30. Commercial Office Buildings	.575	.365	.575	.385
31. Commercial Warehouses	.575	.365	.575	.385
32. Other Commercial Buildings	.756	.688	.866	.394
33. Religious Buildings	.575	.365	.575	.322
34. Educational Buildings	.575	.365	.575	.322
35. Hospital and Institut. Buildings	.575	.365	.575	.365
36. Hotels and Motels	.575	.365	.575	.529
37. Amusement and Recreational	.722	.678	.888	.524
38. Other Nonfarm Buildings	.575	.365	.575	.529
39. Railroads	.846	.819	1.006	.429
40. Telephone and Telegraph	.731	.690	.857	.444
41. Electric Light and Power	.661	.567	.830	.444
42. Gas	.688	.556	.784	.444
43. Local Transit	.846	.869	1.006	.444
44. Petroleum Pipelines	.846	.615	1.006	.444
45. Farm	.575	.535	.575	.375
46. Oil & Gas Explor, Shafts & Wells	.846	.819	1.006	.583
47. Other Mining Shafts and Wells	.846	.819	1.006	.583
48. Other Nonresidential Structures	.575	.365	.575	.420
49. Railroad Replacement Track	.846	.819	1.006	.444
50. Nuclear Fuel	.846	.869	1.006	.862
51. Residential Structures	.576	.405	.578	.474

Source: Authors' calculations as described in the text.

[a] Calculations use an 8% nominal discount rate, composed of a 4 percent inflation rate and a 4 percent real return.

[b] Computed as $a\,z + (k/u)$.

[c] Uses depreciation rates from Table 2. Economic depreciation allowances are indexed for inflation.

straight line over 31.5 years under tax reform. For several types of structures, such as commercial office buildings (assets 29 and 30) and hotels (asset 36), tax reform reduces the present value of depreciation allowances below that based on economic depreciation.

Table 5.4 also shows the present value of total capital cost recovery allowances under prior law. Total recovery allowances measure the value of both depreciation and the investment tax credit. Due to the ITC, the present value of total prior law recovery allowances exceeds the present value of prior law depreciation allowances alone. Comparing column 3 (total recovery allowances) with column 4 (economic depreciation allowances) shows that prior law total cost recovery allowances are generally much more generous than those justified by real economic decay, especially for equipment. Indeed, for many types of equipment the present value of total recovery allowances slightly exceeds unity, so cost recovery is slightly more generous than expensing.

As tax reform repeals the ITC, total recovery allowances are equal to statutory depreciation allowances. Thus, tax reform reduces total cost recovery allowances more than depreciation allowances, compared to prior law levels. Compared with prior law, tax reform pushes total cost recovery allowances towards real economic allowances for all depreciable assets, although it overshoots the mark for a few types of equipment and for several types of structures.

B. Investment Incentives by Asset in the Corporate Sector

In the interest of tractability, we limit our presentation of cost of capital/effective tax rate results to those based on: (1) individual arbitrage, (2) new view financing assumptions, (3) inflation at a 4 percent rate, and (4) a 5 percent real required after all tax rate of return. There is nothing especially compelling about this particular set of assumptions, and results for a variety of alternative assumptions are considered below.

Table 5.5 shows the cost of capital (columns 1 and 2) and effective tax rate (columns 3 and 4) for each of 54 assets (51 depreciable assets plus inventories and two types of land) in the corporate sector. In contrast to the present value of depreciation allowances, the cost of capital or effective tax rate is a comprehensive measure of investment incentives. It fully captures the effects of corporate and personal income taxes at the Federal, state, and local levels, as well as the effects of depreciation allowances, tax credits, and property taxes.

Under prior law, costs of capital in the corporate sector range from a low of 5.3 percent for investment in autos (asset 21) and railroad equipment (asset 24), to a high of 11.1 percent for investment in mobile commercial office buildings (asset 29). Similarly, effective tax rates are lowest for autos (6.3 percent) and railroad equipment (6.5 percent, where the difference from autos is due to rounding), and highest for mobile commercial office buildings (55 percent). Table 5.5 also shows that because of generous total

Table 5.5 Asset Specific Investment Incentives in the Corporate Sector*

Asset	Cost of Capital		Effective Tax Rate	
	Prior Law	Tax Reform	Prior Law	Tax Reform
1. Furniture & Fixtures (Household)	.054	.075	.068	.335
2. Furniture & Fixtures (Other)	.054	.080	.068	.377
3. Fabricated Metal Products	.054	.075	.080	.337
4. Steam Engines and Turbines	.068	.092	.267	.457
5. Internal Combustion Engines	.059	.082	.159	.393
6. Farm Tractors	.054	.085	.070	.410
7. Construction Tractors	.054	.080	.070	.375
8. Other Agricultural Machinery	.054	.079	.067	.364
9. Other Construction Machinery	.054	.081	.071	.385
10. Mining and Oilfield Machinery	.054	.088	.071	.429
11. Metalworking Machinery	.054	.078	.066	.356
12. Special Industry Machinery	.054	.078	.067	.358
13. General Industrial Equipment	.054	.081	.081	.380
14. Office Computing Machinery	.054	.090	.076	.443
15. Service Industry Machinery	.054	.080	.075	.377
16. Communications Equipment	.063	.088	.200	.433
17. Elec. Trans., Dist., & Indus. Appar.	.058	.080	.141	.374
18. Electric Household Appliances	.054	.075	.068	.338
19. Other Electrical Equipment	.054	.076	.068	.340
20. Trucks, Buses and Truck Trailers	.054	.088	.066	.432
21. Autos	.053	.095	.063	.476
22. Aircraft	.054	.089	.072	.441
23. Ships & Boats	.054	.081	.066	.384
24. Railroad Equipment	.053	.075	.065	.331
25. Scientific & Engin. Instruments	.057	.083	.121	.397
26. Photographic Instruments	.054	.079	.069	.364
27. Other Nonresidential Equipment	.054	.079	.070	.367
28. Industrial Buildings	.080	.091	.373	.453
29. Mobile Commercial Offices	.111	.119	.550	.579
30. Commercial Office Buildings	.087	.096	.427	.477
31. Commercial Warehouses	.087	.096	.427	.477
32. Other Commercial Buildings	.065	.078	.228	.358
33. Religious Buildings	.085	.093	.408	.461
34. Educational Buildings	.085	.093	.408	.461
35. Hospital and Institut. Buildings	.086	.095	.421	.473
36. Hotels and Motels	.096	.104	.479	.520
37. Amusement and Recreational	.068	.082	.262	.394
38. Other Nonfarm Buildings	.096	.104	.479	.520
39. Railroads	.057	.074	.122	.322
40. Telephone and Telegraph	.073	.085	.315	.415
41. Electric Light and Power	.075	.092	.334	.458
42. Gas	.079	.093	.365	.460
43. Local Transit	.061	.075	.183	.337
44. Petroleum Pipelines	.061	.090	.183	.443
45. Farm	.087	.087	.424	.427
46. Oil & Gas Explor., Shafts & Wells	.057	.077	.123	.351
47. Other Mining Shafts and Wells	.057	.077	.123	.351
48. Other Nonresidential Structures	.089	.097	.438	.486
49. Railroad Replacement Track	.057	.074	.122	.324
50. Nuclear Fuel	.058	.091	.133	.452
51. Residential Structures	.099	.105	.495	.525
52. Nonresidential Land	.101	.096	.506	.478
53. Residential Land	.108	.103	.539	.514
54. Inventories	.098	.092	.488	.458

Source: Authors' calculations as discussed in the text.

*Calculations assume $s = .05$, $\pi = .04$.

cost recovery allowances (accelerated depreciation plus the ITC) effective tax rates on equipment tend to be lower than on those on other assets.

For structures which generally do not receive the ITC (assets 28-39 and 45-51), effective tax rates tend to be higher and less diverse than for equipment. Public utility structures (assets 40-44), many of which are eligible for the ITC under prior law, generally have effective tax rates somewhere between those on equipment and those on other structures.

Finally, nondepreciable land and inventories (assets 52-54) receive neither accelerated depreciation nor the ITC. Thus, they have costs of capital and effective tax rates which are higher then those on most types of depreciable property (assets 1-51).

Table 5.5 shows that tax reform raises the cost of capital and effective tax rate for corporate investment in all types of depreciable property. Thus, for equipment and structures, the effect of less generous cost recovery allowances combined with a higher capital gains tax rate offsets the combined effect of reductions in the corporate income tax rate and in the rate on dividends.[14] Effective tax rates tend to rise most dramatically for equipment, due to ITC repeal. Nonetheless, equipment still generally faces lower effective tax rates than those on other assets.

In contrast to its effect on depreciable property, tax reform lowers the cost of capital and effective tax rate for investment in nondepreciating land and inventories. These assets benefit from the 11.2 percentage point reduction in the statutory rate on corporate income, but are not penalized by less generous cost recovery allowances. However, these assets still face higher effective tax rates than on most types of depreciable property.

C. Investment Incentives by Sector and Industry

Table 5.6 shows summary measures of investment incentives for broad asset categories, as well as overall, in the corporate, noncorporate business, and owner-occupied housing sectors. These summary measures are calculated using capital weighted averages of the cost of capital, and are useful in highlighting a number of points.

In particular, Table 5.6 shows that the overall average effective tax rate in the corporate sector was 38.7 percent under prior law, substantially below the 49.5 percent statutory rate. In the noncorporate sector the overall average effective rate was lower than in the corporate sector, 33.2 percent, but above the 30.0 percent statutory rate on noncorporate business income. The effective tax rate on owner-occupied housing was lower still, 22.5 percent (it is positive due to property taxes).

In the corporate sector, tax reform increases the overall average effective rate by 5.7 percentage points (or 14.7 percent) to a 44.4 percent rate, which is now above the statutory rate of 38.3 percent. In the noncorporate sector the overall average effective rate rises more modestly, by 0.7 percentage points (or 2.1 percent), to a 33.9 percent rate, but stays above the new statutory rate on noncorporate business income of 26.0 percent.

Table 5.6 **Summary Measures**[a]

	Prior Law	Tax Reform
Corporate Sector Tax Rates		
Equipment[b]	.100	.396
Structures		
Non-residential[c]	.344	.431
Residential[d]	.495	.525
Public Utility[e]	.326	.445
Inventories	.488	.458
Land		
Non-residential	.506	.478
Residential	.539	.514
Overall[f]	.387	.444
Noncorporate Tax Rates		
Equipment[b]	-.119	.254
Structures		
Non-residential[c]	.278	.314
Residential[d]	.382	.406
Public Utility[e]	.221	.336
Inventories	.330	.305
Land		
Non-residential	.361	.338
Residential	.414	.395
Overall[f]	.332	.339
Owner-Occupied Housing Tax Rate	.225	.237
Overall Tax Rate[f]	.333	.365
Standard Deviation of Cost of Capital	.0150	.0114

Source: Authors' calculations as described in the text.

[a] Calculations assume $s=0.05$ and $\pi=0.04$.

[b] Equipment includes all assets 1-27, even though components of several of these assets can be identified as real property.

[c] Non-residential structures includes all assets 28-39 and 45-50, even though components of several are not treated as real property.

[d] This is asset 51.

[e] This includes assets 40-44.

[f] Asset 50, nuclear fuel, is included in the overall average, even though it is not an element of any subcategory.

We also see from Table 5.6 that under prior law investment incentives in both the corporate and the noncorporate sector were biased in favor of depreciable property, especially equipment, compared to nondepreciable property: an exception is residential structures in the noncorporate sector.

Tax reform has a qualitatively similar influence on average effective tax rates in both the corporate and the noncorporate sector. Effective rates on depreciable property, especially equipment, are increased by tax reform, while the effective rates on nondepreciating land and inventories are reduced due to rate reduction. On average, in both sectors, equipment remains the most favored investment after tax reform, and depreciable property (other than residential structures) is favored compared to investment in nondepreciable land. Inventories, which are predominantly a corporate sector asset, continue to be taxed at an above average rate in the corporate sector, but at a below average rate in the noncorporate sector. Finally, residential structures, which are predominantly used in the noncorporate sector, continue to be taxed at an above average rate.

Because of rate reduction and a reduction in the number of itemizers, tax reform increases the effective tax rate on owner-occupied housing by 1.2 percentage points (5.3 percent), to a 23.7 percent rate under tax reform. Thus, in all three sectors overall average effective tax rates rise as a result of tax reform. However, as under prior law, corporate sector investment tends to face higher effective tax rates than those on investment in other sectors. Overall, tax reform increases the economy wide average effective tax rate by 3.2 percentage points (9.6 percent), from a 33.3 percent rate under prior law to a 36.5 percent rate. This suggests that corporate and personal rate reduction is insufficient to offset the effects of ITC repeal, less generous depreciation allowances, and the taxation of capital gains as ordinary income. Table 5.6 includes a calculation of the capital stock weighted standard deviation of the cost of capital across all assets and sectors. Under a perfectly uniform tax system, the cost of capital would not vary across alternative investments, and capital would be efficiently allocated across assets and sectors. In this case the standard deviation in the cost of capital would be zero. All else constant, increases in the standard deviation reflect reductions in uniformity.[15]

Under prior law and tax reform, nonneutralities exist due to differential taxation of assets within each sector, as well as differences in the tax treatment of investments in different sectors. Interasset and intersectoral distortions combine to give a standard deviation in the cost of capital of 0.0150 under prior law.

Our calculation suggests that tax reform reduces deviations in the cost of capital across assets and sectors by 24 percent, to 0.0114. This is the result of four primary influences. First, repeal of the ITC reduces existing biases in favor of equipment. Second, less generous total cost recovery allowances reduce existing biases in favor of depreciable property relative to land and inventories. Third, because there is no offsetting fall in the value of

depreciation allowances (uz), rate reduction primarily benefits non-depreciating land and inventories. This further reduces the (relative) advantage of depreciable compared with nondepreciable investment. Fourth, the reduction in personal rates and in the number of itemizers reduces the tax advantages of owner-occupied housing compared with investment in the noncorporate sector. However, some effects work in the opposite direction. Tax reform widens the difference between the overall average effective tax rate in the corporate sector compared with that in the noncorporate sector and that in the owner-occupied housing sector. In addition, tax reform increases the diversity in the tax treatment of various types of equipment, especially within the corporate sector. Nonetheless, on the whole capital is allocated more efficiently under tax reform than under prior law, as shown by a lower standard deviation of the cost of capital.

Table 5.7 shows the cost of capital and effective tax rate for each of 60 industries. Under prior law, effective tax rates range from 14 percent in the water transportation industry to 43.8 percent in the production of transportation equipment other than motor vehicles. In general, under prior law rates tend to be higher in heavily corporate industries, such as manufacturing, than in noncorporate industries, such as services.

Tax reform would generally raise industry effective tax rates, while changing the relative treatment of industries and tightening the distribution. The lowest effective rate is 33.1 percent in agriculture, reflecting the benefit of rate reduction for nondepreciable land. The highest effective tax rate is 45.9 percent for the insurance industry. In general, heavily corporate industries, such as manufacturing, continue to face above average effective tax rates.

V. THE EFFECTS OF THE COMPONENTS OF TAX REFORM

The net effect of the 1986 tax reform act on investment incentives is a combination of the effects from corporate rate reduction, ITC repeal, changes in depreciation allowances, and personal rate reduction. It is interesting to look at the effect on investment incentives of each of these separate components of tax reform. The results of this analysis are reported in Table 5.8. The first column of Table 5.8 reprints the prior law column of Table 5.6. Each succeeding column in Table 5.8 shows the effective tax rate for the change indicated by the column heading.

A. Corporate Rate Reduction

These calculations maintain the ITC, ACRS, and prior law personal tax rates. The tax rate on corporate income is lowered, however, by 11.2 percentage points (or 22.6 percent) to its 38.3 percent rate under tax reform. With the lower statutory corporate rate, the overall average effective tax

Table 5.7 Cost of Capital and Effective Tax Rate by Industry*

Industry	Prior Law		Tax Reform	
	Cost of Capital	Effective Tax Rate	Cost of Capital	Effective Tax Rate
1. Farms	.076	.340	.075	.331
2. Agriculture Serv., Forestry & Fish	.077	.352	.078	.361
3. Metal Mining	.075	.329	.091	.449
4. Coal Mining	.069	.271	.089	.438
5. Oil and Gas Extraction	.065	.226	.080	.376
6. Nonmetalic Minerals	.072	.307	.089	.439
7. Construction	.084	.403	.086	.418
8. Lumber and Wood Products	.079	.369	.088	.429
9. Furniture and Fixtures	.085	.409	.091	.452
10. Stone, Clay and Glass Products	.082	.393	.090	.443
11. Primary Metal Industries	.086	.419	.089	.441
12. Fabricated Metal Products	.086	.416	.090	.445
13. Nonelectrical Machinery	.086	.417	.090	.445
14. Electric and Electronic Equip.	.086	.417	.090	.447
15. Other Vehicles and Equipment	.080	.374	.089	.438
16. Other Transportation Equipment	.089	.438	.091	.449
17. Instruments	.087	.425	.091	.449
18. Misc. Manufacturing Industries	.070	.288	.087	.425
19. Food and Kindred Products	.085	.411	.090	.445
20. Tobacco Manufacturers	.085	.413	.090	.444
21. Textile Mill Products	.083	.397	.089	.437
22. Apparel	.082	.390	.088	.429
23. Paper Products	.076	.338	.087	.426
24. Printing and Publishing	.077	.351	.088	.430
25. Chemicals	.073	.312	.083	.397
26. Petroleum and Coal Products	.075	.330	.087	.426
27. Rubber and Misc. Plastic Products	.078	.361	.088	.431
28. Leather	.084	.407	.089	.440
29. Railroad Transportation	.060	.161	.076	.342
30. Land Passenger Transportation	.065	.230	.079	.367
31. Trucking and Warehousing	.066	.237	.082	.387
32. Water Transportation	.058	.140	.080	.376
33. Airlines	.061	.175	.090	.447
34. Nongas Pipelines	.064	.218	.090	.444
35. Transportation Services	.060	.164	.075	.333
36. Telephone and Telegraph	.070	.284	.087	.427
37. Radio and TV Broadcasting	.066	.242	.087	.424
38. Electric Utilities	.074	.324	.088	.435
39. Gas Utilities	.078	.361	.092	.456
40. Sanitation Utilities	.079	.369	.085	.414
41. Wholesale Trade	.079	.365	.081	.380
42. Retail Trade	.086	.416	.086	.417
43. Commercial and Mutual Banks	.073	.312	.088	.430
44. Other Credit Agencies	.068	.264	.086	.420
45. Security and Commodity Services	.078	.360	.082	.394
46. Insurance Carriers	.078	.363	.092	.459
47. Insurance Agents and Services	.076	.344	.078	.358
48. Real Estate	.081	.386	.083	.396
49. Investment and Holding Co.	.075	.335	.078	.362
50. Hotels and Motels	.082	.391	.092	.455
51. Personal Services	.069	.271	.080	.373
52. Business Services	.062	.192	.085	.412
53. Auto Repair Services	.059	.151	.083	.398
54. Misc. Repair Services	.063	.211	.077	.350
55. Motion Pictures	.064	.219	.083	.395
56. Amusement & Recreational Services	.063	.209	.079	.366
57. Health Services	.068	.265	.081	.382
58. Legal Services	.068	.265	.076	.338
59. Educational Services	.064	.222	.083	.396
60. Social & Professional Services	.075	.337	.084	.404

Source: Authors' calculation as described in the text.

*Calculations are for a capital weighted average of the corporate and noncorporate sectors of each industry, and assume $s = 0.05$ and $\pi = 0.04$.

Table 5.8 **Components of Tax Reform***

	Change From Prior Law				
	Prior Law	Corp. Rate Reduction	ITC Repeal	1986 Act Depreciation	Pers. Rate Reduction
Corporate Tax Rates					
Equipment	.100	.063	.396	.145	.149
Structures					
Non-residential	.344	.319	.385	.417	.373
Residential	.495	.459	.495	.557	.515
Public Utility	.326	.307	.412	.383	.355
Inventories	.488	.435	.488	.488	.513
Land					
Non-residential	.506	.457	.506	.506	.529
Residential	.539	.496	.539	.539	.559
Overall	.387	.343	.447	.414	.416
Noncorporate Tax Rates					
Equipment	-.119	-.119	.265	-.100	-.142
Structures					
Non-residential	.278	.278	.293	.321	.263
Residential	.382	.382	.383	.426	.366
Public Utility	.221	.221	.326	.254	.208
Inventories	.330	.330	.330	.330	.305
Land					
Non-residential	.361	.361	.361	.361	.338
Residential	.414	.414	.414	.414	.395
Overall	.332	.332	.349	.345	.311
Owner-Occupied Housing Tax Rate	.225	.225	.225	.225	.233
Overall Tax Rate	.333	.312	.368	.350	.341
Standard Deviation of Cost of Capital	.0150	.0125	.0124	.0162	.0161

Source: Authors' calculations as described in the text. In each column, only one component is simulated.

*Calculations assume $s=0.05$, $\pi=0.04$.

rate in the corporate sector falls by 4.4 percentage points (11.4 percent), from a 38.7 percent rate under prior law to a 34.3 percent rate. This relatively small fall in the effective tax rate is due in part to issues involving debt finance. While corporate rate reduction lowers the taxation of earnings, it also reduces the benefit of interest deductibility on the one-third of corporate investment that is financed by debt. If instead we assume 100 percent equity financing, then the effective tax rate in the corporate sector would fall more substantially, from a 52 percent effective rate under prior law to a 44 percent effective rate under tax reform (a reduction of 15.4 percent).

For two reasons corporate rate reduction also promotes neutrality, as indicated by a fall in the standard deviation of the cost of capital, compared to prior law. First, rate reduction lowers effective tax rates in the corporate sector compared with the already lower effective tax rates in the noncorporate and owner-occupied housing sectors. Second, because statutory rate reduction lowers the value of accelerated depreciation allowances, it reduces the cost of capital for depreciable assets by a smaller proportional amount than it reduces the cost of capital for land and inventories. Thus, a fall in the statutory corporate rate reduces corporate sector incentives to invest in equipment and structures relative to land and inventories.

B. ITC Repeal

For these calculations prior law is maintained except for the ITC, which is eliminated for all assets. ITC repeal by itself significantly raises effective tax rates on equipment and public utility property, compared to prior law. This is especially important in the corporate sector where most equipment and public utility property is employed. ITC repeal raises the overall corporate effective rate by six percentage points (15.5 percent) to a 44.7 percent rate from the 38.7 percent rate under prior law. Thus, the increase in corporate sector effective tax rates due to ITC repeal more than offsets the fall in corporate sector effective tax rates due to statutory rate reduction.

Because of the smaller weight on equipment and public utility property, ITC repeal has a less dramatic effect in the noncorporate sector, and the overall effective tax rate there rises by only 1.7 percentage points (5.1 percent). The overall economy wide average effective tax rate rises by 3.5 percentage points (10.5 percent), from a 33.3 percent rate to a 36.8 percent rate.

By itself, ITC repeal also promotes uniform taxation of capital, compared to prior law, as shown by the reduction in the standard deviation of the cost of capital. In particular, ITC repeal goes a long way towards equalizing the tax treatment of equipment relative to structures, as well as depreciable property relative to land and inventories.[16]

C. Depreciation Allowances

For this comparison, ACRS recovery classes are replaced by the 1986 Act cost recovery classes, but the ITC is maintained. In general, tax reform recovery allowances are less generous than ACRS allowances. Not surprisingly, then, effective tax rates for depreciable property rise compared to prior law levels. Their increase is more dramatic in the corporate sector where depreciation allowances are valued at the relatively high 49.5 percent (combined) statutory tax rate, than in the noncorporate sector, where depreciation allowances are valued at the lower 30 percent rate on noncorporate business income. The new depreciation allowances raise the overall average effective tax rate in the corporate sector by 2.7 percentage points (7.0 percent) to a 41.4 percent rate. The overall average rate in the noncorporate sector rises

less significantly, by 1.3 percentage points (3.9 percent). The smaller increase in the noncorporate compared with the corporate sector is due to the lower noncorporate statutory tax rate and the smaller ratio of depreciable to nondepreciable assets in noncorporate sector. The overall economy wide effective tax rate rises by 1.7 percentage points (5.1 percent) to a 35.0 percent rate.

By themselves, the new recovery allowances (without ITC repeal) slightly widen the dispersion of the cost of capital, compared with prior law. One reason for this is slightly larger intersectoral distortions. In addition, the new depreciation allowances generate further differences in the tax treatment of some disaggregate types of depreciable property (especially equipment), compared to prior law.

D. Personal Rate Reduction

For these calculations, prior law personal rates on capital income are replaced by the personal taxes obtained under tax reform. Somewhat surprisingly, personal rate "reduction" increases the overall average effective tax rate in the corporate sector by 2.9 percentage points (7.5 percent), to a rate of 41.6 percent. This increase is due to the emphasis given to retentions as a source of financing, in combination with the large (68.9 percent) increase in the tax rate on capital gains income. Since the tax rate on dividends falls, effective tax rates in the corporate sector could fall, rather than rise as indicated in Table 5.8, if new share financing represented a larger proportion of corporate equity financed investment.[17]

In the noncorporate sector, the overall average effective tax rate falls to by 2.1 percentage points (6.3 percent) to a rate of 31.1 percent. This is due to the reduction in the statutory tax rate on noncorporate business income. The effective tax rate on owner-occupied housing rises slightly, to 23.3 percent, due to a reduction in the rate at which property taxes are deducted and to a reduction in the fraction of homeowners who itemize. The overall average rate for the economy rises by 0.8 percentage points (2.4 percent), from 33.3 percent to 34.1 percent.

On the whole, personal rate reduction slightly increases the nonneutralities. This is due in large part to the increase in the rate on accrued capital gains, which substantially increases effective tax rates in the corporate sector compared to those in the noncorporate and owner-occupied housing sectors. In addition, the reduction in the rate on noncorporate business income further expands differences in the taxation of corporate sector investment compared with investment in the noncorporate sector.

VI. RESULTS FOR ALTERNATIVE ARBITRAGE, PROFITABILITY AND FINANCING ASSUMPTIONS

In this section we explore the effects of alternative arbitrage, rate of

return, and financing assumptions on our measurement of investment incentives.

A. Individual vs. Firm Arbitrage

All calculations above use individual arbitrage. Table 5.9 compares effective tax rates based on individual arbitrage with those based on firm arbitrage. For both prior law and tax reform, overall average effective tax rates are reduced by using firm instead of individual arbitrage. In general, however, the more important are arbitrage assumptions, the larger is the disparity in the tax treatment of alternative investors. Tax reform improves neutrality. Thus, the choice of arbitrage assumptions has a smaller influence on overall average effective tax rates under tax reform than it did under prior law. This means, however, that the choice of arbitrage assumptions can be important in evaluating tax reform.[18]

Table 5.9 **Individual Arbitrage Compared with Firm Arbitrage***

	Individual Arbitrage		Firm Arbitrage	
	Prior Law	Tax Reform	Prior Law	Tax Reform
Corporate Tax Rates				
Equipment	.100	.396	-.104	.389
Structures				
Non-residential	.344	.431	.288	.423
Residential	.495	.525	.482	.531
Public Utility	.326	.445	.286	.444
Inventories	.488	.458	.422	.435
Land				
Non-residential	.506	.478	.453	.463
Residential	.539	.514	.506	.511
Overall	.387	.444	.313	.432
Noncorporate Tax Rates				
Equipment	-.119	.254	-.100	.240
Structures				
Non-residential	.278	.314	.263	.301
Residential	.382	.406	.361	.388
Public Utility	.221	.336	.201	.320
Inventories	.330	.305	.320	.296
Land				
Non-residential	.361	.338	.348	.326
Residential	.414	.395	.396	.379
Overall	.332	.339	.319	.326
Owner-Occupied Housing Tax Rate	.225	.237	.189	.207
Overall Tax Rate	.333	.365	.281	.335
Standard Deviation of Cost of Capital	.0150	.0114	.0177	.008

Source: Authors' calculations as described in the text.

*Calculations assume s=0.05 and 0.04.

Compared with prior law, tax reform causes a smaller rise in corporate effective tax rates under individual arbitrage (5.7 percentage points or 14.7 percent) than under firm arbitrage (11.9 percentage points or 38 percent). On average, the comparison between noncorporate sector effective rates under prior law with those under tax reform is unaffected by arbitrage assumptions. The rate on owner-occupied housing rises more for firm arbitrage than for individual arbitrage. Consequently, compared to prior law, tax reform increases the overall economy wide average effective rate more sharply under firm arbitrage (5.4 percentage points or 19.2 percent) than it does under individual arbitrage (3.2 percentage points or 9.6 percent). Under either arbitrage assumption, however, tax reform improves neutrality, as indicated by a lower standard deviation in the cost of capital.

B. Required Real After-Tax Return

Table 5.10 shows effective tax rates under prior law and tax reform for a low, 2 percent, return and a high, 8 percent, return, in addition to the 5 percent return assumed in earlier calculations. Lowering s from 5 percent to 2 percent raises overall average effective tax rates in all sectors under both prior law and tax reform. An increase in s from 5 percent to 8 percent lowers overall average effective tax rates in all sectors. Tax reform causes a smaller rise (both absolutely and on a percentage basis) in effective tax rates, compared to prior law levels, the higher is the real required net-of-tax return on investment. For all three values of s, tax reform improves neutrality compared with prior law.

C. Financing Assumptions

The calculations above assume marginal investments are financed like the existing capital stock. All sectors finance new investments with one-third debt and two-thirds equity. In addition, corporate equity is obtained mostly from retained earnings (93 percent), and less significantly from new share issues (7 percent), consistent with the "new view" that dividend taxation is relatively unimportant. However, we do not know how the marginal investment is financed, and therefore it seems desirable to explore the effects of alternative specifications. Fortunately, the Fullerton-Henderson model allows us to incorporate alternative financing arrangements simply by changing the weights in equations (5.2)-(5.4). In Table 5.11 we present results based on several alternative financing assumptions. For purposes of comparison, however, the first column of Table 5.11 shows effective tax rates for the one-third debt, two-third equity new view case analyzed earlier in Table 5.6.

Stiglitz (1973) has argued that marginal investments may be totally debt financed. Under both prior law and tax reform, debt financed investment in all three sectors is subsidized because interest payments are deducted at higher rates than those applied to subsequent interest receipts. In the

Table 5.10 **Alternative Real Rates of Return***

	Low (S=2%)		Middle (S=5%)		High (S=8%)	
	Prior Law	Tax Reform	Prior Law	Tax Reform	Prior Law	Tax Reform
Corporate Tax Rates						
Equipment	-.034	.530	.100	.396	.145	.356
Structures						
Non-residential	.445	.554	.344	.431	.329	.397
Residential	.621	.656	.495	.525	.460	.480
Public Utility	.460	.582	.326	.445	.300	.405
Inventories	.516	.528	.488	.458	.481	.437
Land						
Non-residential	.554	.565	.506	.478	.493	.450
Residential	.615	.623	.539	.514	.515	.476
Overall	.435	.551	.387	.444	.381	.412
Noncorporate Tax Rates						
Equipment	-.448	.395	-.119	.254	-.048	.213
Structures						
Non-residential	.410	.450	.278	.314	.245	.275
Residential	.546	.568	.382	.406	.329	.348
Public Utility	.388	.498	.221	.336	.175	.286
Inventories	.399	.384	.330	.305	.310	.281
Land						
Non-residential	.457	.445	.361	.338	.331	.304
Residential	.545	.537	.414	.395	.368	.344
Overall	.439	.462	.332	.339	.301	.300
Owner-Occupied Housing Tax Rate	.429	.443	.225	.237	.149	.159
Overall Tax Rate	.435	.497	.333	.365	.305	.323
Standard Deviation of Cost of Capital	.0081	.0056	.0150	.0114	.0235	.0183

Source: Authors' calculations as described in the text.

*Calculations assume $\pi = 0.04$ and individual arbitrage.

corporate sector under prior law interest payments are deducted at the 49.5 percent combined statutory rate. Corresponding interest receipts, however, are subject to taxation at a lower 21.9 percent rate, implying that corporate sector debt finance enjoys a subsidy equal to 27.6 percent of nominal interest payments. In the noncorporate sector, the subsidy equals 8.1 percent, and in the owner-occupied housing sector the subsidy equals 4 percent. Tax reform reduces to 18.9 percent the subsidy to corporate debt since it narrows the spread between the statutory corporate income tax rate (38.3 percent) and the tax rate on interest income (19.4 percent). Similarly, tax reform lowers the subsidy in the noncorporate sector to 6.6 percent. In the owner-occupied housing sector the subsidy falls to 3.1 percent as a result of tax reform.

Column 2 of Table 5.11 shows effective total tax rates for investments financed using debt alone. With 100 percent debt finance, effective tax rates are reduced substantially below those in column one, where the subsidy on debt

Table 5.11 Alternative Financing[a]

	One-Third Debt, Two-Thirds Equity, New View[b]		All Debt[c]		All Equity[d]		One Third Debt, Two-Thirds Equity, Old View[e]		External Finance[f]	
	Prior Law	Tax Reform	Prior Law	Tax Reform	Prior Law	Tax Reform	Prior Law	Tax Reform	Prior Law	Tax Reform
Corporate Tax Rates										
Equipment	.100	.396	-1.399	.042	.323	.493	.245	.433	.366	.471
Structures										
Non-residential	.344	.431	-.326	.092	.483	.524	.433	.467	.512	.503
Residential	.495	.525	.086	.280	.592	.596	.557	.552	.613	.580
Public Utility	.326	.445	-.297	.136	.465	.532	.414	.478	.494	.513
Inventories	.488	.458	-.144	.082	.600	.551	.561	.494	.623	.530
Land										
Non-residential	.506	.478	-.057	.139	.612	.565	.574	.511	.633	.546
Residential	.539	.514	.081	.233	.632	.590	.598	.543	.651	.573
Overall	.387	.444	-.339	.099	.522	.535	.474	.479	.549	.515
Noncorporate Tax Rates										
Equipment	-.119	.254	-.316	.184	-.040	.285	-.119	.254	-.119	.254
Structures										
Non-residential	.278	.314	.188	.250	.317	.342	.278	.314	.278	.314
Residential	.382	.406	.314	.356	.412	.428	.382	.406	.382	.406
Public Utility	.221	.336	.127	.278	.261	.362	.221	.336	.221	.336
Inventories	.330	.305	.240	.234	.368	.336	.330	.305	.330	.305
Land										
Non-residential	.361	.338	.279	.274	.395	.366	.361	.338	.361	.338
Residential	.414	.395	.346	.342	.443	.418	.414	.395	.414	.395
Overall	.332	.339	.248	.277	.368	.366	.332	.339	.332	.339
Owner-Occupied Housing Tax Rate	.225	.237	.187	.209	.243	.250	.225	.237	.225	.237
Overall Tax Rate	.333	.365	.067	.196	.418	.427	.377	.384	.423	.405
Standard Deviation of Rho	.0150	.0114	.0160	.0073	.0225	.0184	.0195	.0140	.0260	.0172

Source: Authors' calculations as described in the text.

[a] Calculations assumes $s=0.05$, $\pi=0.04$, and individual arbitrage.

[b] $C_d = 0.34$, $C_{re} = 0.61$, $C_{ns} = 0.05$

[c] $C_d = 1.00$, $C_{re} = 0.00$, $C_{ns} = 0.00$

[d] $C_d = 0.00$, $C_{re} = 0.93$, $C_{ns} = 0.07$

[e] $C_d = 0.34$, $C_{re} = 0.33$, $C_{ns} = 0.33$

[f] $C_d = 0.34$, $C_{re} = 0.00$, $C_{ns} = 0.66$

only applies to 33 cents on a one dollar marginal investment. For both tax regimes, debt finance reduces effective total tax rates more in the corporate sector than in the noncorporate sector because the higher statutory rate on corporate income means a larger subsidy in the corporate sector. However, tax reform reduces the subsidy to debt in all sectors. Thus, even with 100 percent debt finance, property taxes insure that effective total tax rates in all sectors remain positive under tax reform. In contrast, under prior law the overall influence of the subsidy to debt outweighs the influence of property taxes on corporate sector investment, and the corresponding overall average effective total tax rate is negative. The third column of Table 5.11 shows effective total tax rates for the other extreme of all equity financed marginal investments.

Charles McLure (1979), among others, has argued that dividend payout rates are important, and that the double taxation of dividends represents a significant disincentive to corporate sector investment. This perspective has been called the "old view" of dividend taxation. Initially, arguments against the old view and in favor the new view that dividend payout rates are unimportant were well received. However, subsequent empirical work has not given decisive support to either perspective on the importance of dividend taxes.[19]

During the 1980's, dividends as a fraction of after-tax corporate profits, the dividend payout ratio, have varied between .39 and .77 (Economic Report of the President, 1986, Table B-84). After refining the measure of profits by adjusting for the effect of inflation on the real cost of debt, Shoven (1986) finds that the long run equilibrium dividend payout ratio has varied between .30 and .37 over the period from 1960 to 1982.

We choose a 50 percent payout ratio as our interpretation of the old view that dividend taxes matter, and err on the side of a generous difference between discount rates under the old compared with the new view. To implement an analysis consistent with findings under the old view for a 50 percent dividend payout ratio we give equal weight to new share issues and retained earnings as sources of corporate equity. One third of corporate sector marginal investment remains financed using debt,[20] and financing in the noncorporate and owner-occupied housing sectors remains one-third debt and two-thirds equity.

The results of our old view calculations are shown in the fourth column of Table 5.11. Both for prior law and tax reform, the larger emphasis given to dividends relative to capital gains raises effective total tax rates in the corporate sector (and consequently for the entire economy), compared with new view levels. However, the spread between the dividends tax rate and the capital gains tax rate is wider under prior law than it is under tax reform. Thus, the corresponding increase in effective tax rates is greater under prior law (the overall corporate effective tax rate rises from .387 based on the new view to .474 based on the old view). than it is under tax reform (where old view assumptions raise the overall total effective tax rate in the corporate sector from .444 to .479). Furthermore, tax reform actually lowers the

dividend tax compared to prior law. Thus, based on old view assumptions, tax reform only increases the overall average effective tax rate in the corporate sector by a scant 0.5 percentage points (1.1 percent), from a 47.4 percent rate under prior law to a 47.9 percent rate under tax reform. As a consequence, the overall economy wide average effective rate only rises by 1.9 percent, or about 20 percent of the 9.6 percent increase obtained under the new view. Therefore, neutrality is improved at the expense of a much smaller reduction in overall average incentives to save and invest under the old view than it is under the new view. Tax reform compares more favorably with prior law when dividend taxes are more important.

The fifth column of Table 5.11 shows effective total tax rates when retained earnings are unavailable as a source for financing marginal investments. It may be, for example, that required dividend payments make retained earnings unavailable for financing extra investment, at least for some corporations. These corporations must finance new marginal investment externally, by issuing either new shares or debt. In these calculations, we assume that corporate financing of real investment is one-third debt and two-thirds new share issues. Investment in the noncorporate business sector and the owner-occupied housing sector remains one-third debt, two-thirds equity.

When marginal corporate investments are financed externally, tax reform actually reduces the overall total corporate sector effective tax rate from 54.9 percent under prior law to 51.5 percent. This 3.4 percentage point reduction is due to the reform-induced fall in the dividend tax.

VII. INFLATION, EFFECTIVE TAX RATES, AND INDEXATION

So far, we have performed all calculations using a 4 percent inflation rate. It is important, however, to see how variations in inflation affect investment incentives.

A. Influence of Inflation on Effective Tax Rates Under Prior Law and Tax Reform

Under both prior law and tax reform, inflation influences effective tax rates through at least three channels. First, inflation reduces the real value of recovery allowances, which are based on historic cost and not indexed for inflation. This increases effective tax rates on depreciable property. Second, in the corporate sector inflation increases effective tax rates because purely inflationary distributions and retained earnings are subject to tax. However, a third effect works in the opposite direction. In all three sectors, nominal interest payments are deducted at a higher rate than applied to interest receipts, and therefore are subsidized. Since inflation increases nominal interest payments, it increases this subsidy to debt, thus lowering effective tax rates.

Panel 1 of Table 5.12 shows that prior law effective tax rates exhibit varying responses to rising inflation. Because recovery allowances are unindexed, effective tax rates on depreciable property rise with inflation. The effective tax rate on corporate equipment, for example, increases from -8.9 percent to +21.4 percent as inflation rises from a zero percent to an 8 percent rate. In contrast to depreciable property, effective tax rates on nondepreciable land and inventories fall with inflation, due to the rising

Table 5.12 **Influence of Inflation on Effective Tax Rates**[a]

Inflation Rate	0%	4%	8%
1. Prior Law			
Effective Tax Rates			
Corporate Sector			
Equipment	-.089	.100	.214
Non-residential Structures	.286	.344	.373
Non-residential Land	.525	.506	.486
Inventories	.508	.488	.467
Overall	.366	.387	.398
Noncorporate Sector			
Overall	.334	.332	.326
Owner-Occupied Housing	.233	.225	.217
Overall	.325	.333	.334
Standard Deviation in the Cost of Capital	.0175	.0150	.0133
2. Tax Reform			
Effective Tax Rates			
Corporate Sector			
Equipment	.312	.396	.454
Non-residential Structures	.375	.431	.465
Non-residential Land	.469	.478	.486
Inventories	.448	.458	.466
Overall	.405	.444	.472
Noncorporate Sector			
Overall	.338	.339	.335
Owner-Occupied Housing	.243	.237	.231
Overall	.346	.365	.378
Standard Deviation in the Cost of Capital	.0097	.0114	.0135[b]

Source: Authors' calculations as described in the text.

[a] Calculations assume s=0.05 and individual arbitrage.

[b] At 8 percent inflation, the standard deviation is greater for tax reform than for prior law. This does not mean, however, that tax reform worsens neutrality. A better measurement of dispersion might be the coefficient of variation, which equals the standard deviation divided by the mean. (Neither is a perfectly correct measure of neutrality.) The coefficient of variation for prior law (at 8 percent inflation) is .0398. Tax reform (at 8 percent inflation) lowers this to .0357. Thus, tax reform may still improve neutrality. At some higher inflation rate, however, assets may be taxed more uniformly under prior law than tax reform.

benefit of nominal interest deductions. Overall, effective tax rates in the corporate sector slightly increase with inflation, rising from 36.6 percent when there is no inflation to 39.8 percent at an inflation rate of 8 percent. Because of the relative importance of non-depreciable land, the overall average effective tax rate in the noncorporate sector falls as inflation rises. The effective rate on owner-occupied housing falls slightly as inflation rises, due to the increasing subsidy on debt.

Under prior law the overall economy wide average effective tax rate rises slightly (by 2.8 percent) as inflation increases from 0 percent to 8 percent. Thus, the effects due to unindexed cost recovery allowances and the taxation of purely nominal corporate profits outweigh the benefit arising from the subsidy to debt. This result is similar to that obtained by Feldstein and Summers (1979), and in contrast to that obtained by Fullerton (1987), who uses a similar model. In our model, (and in Fullerton's) the influence of inflation on the overall effective tax rate depends on such parameters as personal tax rates and capital stock weights. It also depends on the arbitrage assumption. Indeed, this is an important factor explaining the difference between our result and Fullerton's. When our analysis is redone using the firm arbitrage assumption of Fullerton (1987), we also find that prior law effective tax rates fall slightly with inflation. This ambiguity aside, it is clear that inflation can cause arbitrary unintended changes in effective tax rates across assets and sectors. Thus, to the extent that effective tax rates at some target rate of inflation reflect tax policy, an unindexed tax system will not fulfill Congress' intent if inflation changes unexpectedly.

Panel 2 of Table 5.12 shows how effective tax rates under tax reform respond to changes in inflation. Because tax reform increases the tax rate on capital gains and reduces the subsidy to debt, the taxation of inflationary capital gains is more important than the deduction of inflationary interest payments in the corporate sector. Thus, in contrast with prior law, corporate sector effective tax rates on nondepreciable assets rise with inflation. For the same reason, as well as the erosion of depreciation allowances defined in nominal terms, effective tax rates on depreciable assets continue to rise with inflation. Thus, the effective tax rate on all corporate assets rises with inflation, so the overall average effective rate in the corporate sector rises with inflation under tax reform.

The overall average effective tax rate in the noncorporate sector, as well as the effective rate on owner-occupied housing, falls as inflation rises from zero to an 8 percent rate. As under prior law, this reflects the rising benefits of subsidized interest payments in the noncorporate and owner-occupied housing sectors. The overall average effective tax rate for the entire economy, however, rises by 3.2 percentage points (9.2 percent) as inflation increases from 0 to 8 percent. This increase is sharper than that obtained under prior law (as is the rise in the overall average rate in the corporate sector), and the difference is due to the higher tax rate imposed on purely nominal capital gains, the reduced subsidy to debt, and the slower cost recovery provisions of the Tax Reform Act of 1986.

B. Indexation of Depreciation and Capital Gains for the Effects of Inflation

Our analysis above shows that effective tax rates are sensitive to inflation. Of particular concern to many policy analysts is the erosion in the value of depreciation allowances due to inflation. Indeed, the original Treasury proposal for tax reform, the President's proposal, and the House Bill all would have provided some indexation of depreciation allowances for inflation.

The first panel of Table 5.13 shows effective tax rates when depreciation allowances are fully indexed for inflation. Comparing these rates with those

Table 5.13 **Indexation and Effective Tax Rates***

Inflation Rate	0%	4%	8%
1. Tax Reform with Indexed Depreciation Allowances			
Effective Tax Rates			
Corporate Sector			
Equipment	.312	.323	.335
Non-residential Structures	.375	.385	.395
Non-residential Land	.496	.478	.486
Inventories	.448	.458	.466
Overall	.405	.415	.424
Noncorporate Sector			
Overall	.338	.325	.311
Owner-Occupied Housing	.243	.237	.231
Overall	.346	.346	.345
Standard Deviation in the Cost of Capital	.0097	.0104	.0112
2. Tax Reform with Indexed Depreciation Allowances and Indexed Capital Gains			
Effective Tax Rates			
Corporate Sector			
Equipment	.312	.278	.241
Non-residential Structures	.375	.344	.311
Non-residential Land	.469	.445	.418
Inventories	.448	.422	.393
Overall	.405	.377	.345
Noncorporate Sector			
Overall	.338	.325	.311
Owner-Occupied Housing	.243	.237	.231
Overall	.346	.327	.307
Standard Deviation in the Cost of Capital	.0097	.0086	.0076

Source: Authors' calculations as described in the text.

*Calculations assume $s = 0.05$ and individual arbitrage.

for unindexed tax reform in panel 2 of Table 5.12 shows that indexing depreciation allowances sharply reduces effective tax rates on depreciable property, and makes these rates less sensitive to inflation. Consequently, the overall average effective tax rate in the corporate sector is lower and rises less sharply with inflation than when depreciation is not indexed. In the noncorporate sector, the overall average rate is lower and falls more rapidly than when allowances are not indexed (with indexation there is no offset to the rising subsidy on debt). Overall, with depreciation indexation the economy wide average effective tax rate is almost constant as inflation varies from 0 percent to 8 percent, in contrast to a 3.2 percentage point increase when depreciation allowances are not indexed for inflation.

If we compare these effective tax rates for tax reform plus indexed depreciation with those for (unindexed) prior law in panel 1 of Table 5.12, we see that tax reform would have caused a much smaller increase in effective tax rates on depreciable property, as well as in the overall average effective tax rate for the corporate sector and the economy as a whole, had depreciation been indexed. In the noncorporate sector with depreciation indexing the overall average rate is below its prior law level. Furthermore, for positive inflation rates, the standard deviation in the cost of capital is reduced by indexing depreciation allowances, and neutrality is improved, compared with prior law and (unindexed) tax reform. In part, this is due to a reduction in the differential between tax rates on business investment in depreciable property compared to that on owner-occupied housing.

The 60 percent exclusion of long-term capital gains under prior law has been justified as compensation for the failure to adjust taxable gains for inflation. Tax reform repeals the exclusion, and treats capital gains as ordinary income. This treatment as ordinary income sharply increases the tax rate on accrued gains compared to its prior law level, and is a primary reason for higher corporate and overall economy wide average effective tax rates under tax reform than under prior law. Commentators have suggested that tax reform could be improved upon by indexing capital gains form inflation. Yolanda Henderson[21] has stated that the principal weakness in the Tax Reform Act of 1986 is the failure to index both depreciation and capital gains for the effects of inflation. The second panel of Table 5.13 provides the results of our analysis of this issue.[22]

For positive inflation rates, indexing both capital gains and depreciation allowances further reduces corporate sector effective tax rates. With both depreciation and capital gains indexing the overall average effective tax rate in the corporate sector, as well as the overall average economy wide effective rate, are below their (unindexed) prior law levels for inflation rates of 4 and 8 percent. Due to a reduction in the effective rates in the corporate sector compared to the already lower rates in the noncorporate and owner-occupied housing sectors, taxation is more uniform with both depreciation and capital gains indexation than for (unindexed) prior law, the actual (unindexed) tax reform act, or tax reform plus depreciation indexing.

Finally, we note that the combined effects of depreciation and capital gains indexing cause effective taxes in the corporate sector to fall with inflation. Indexing removes the effective tax rate increasing influences of the erosion of the value of depreciation allowances and the taxation of purely nominal corporate retained profits, but leaves the tax reducing influence of higher nominal interest deductions. Overall average effective tax rates in all sectors now fall with inflation. Thus, while these indexing provisions reduce effective tax rates and improve neutrality for a given inflation rate, they do not eliminate uncertainty due to unexpected changes in the inflation rate.

VIII. EFFECTS OF ACCOUNTING PROVISIONS ON MEASURED INVESTMENT INCENTIVES

The effective tax rate model we have employed captures the influence of changes in statutory income tax rates, investment tax credits, and depreciation allowances on investment in 51 depreciable and 3 nondepreciable assets in the corporate and noncorporate sectors of 60 different industries, as well on investment in owner-occupied housing. The model, however, is not exhaustive. It has been criticized for omitting the effect of several important business tax provisions which are substantially tightened by tax reform (see, for example, Ballentine (1986)). Thus, the model has been accused of systematically understating the increase in effective tax rates caused by tax reform.

In this section, we present a tentative analysis of the effect on marginal investment incentives of major reforms in accounting rules. We conclude that many "omissions" have no influence on marginal investment incentives of the type measured in this paper. They do not affect taxes paid on income generated by a uniform expansion of the existing capital stock. However, cost capitalization rules for multi-period accounting do affect marginal investment incentives. Our estimates suggest that including these rules causes tax reform to compare somewhat less favorable with current law than when these rules are ignored. For the economy as a whole, however, this effect is small.

First consider installment sales. Rules regarding installment sales are sometimes said to affect marginal investment incentives. In contrast, however, we would argue they have no influence on investment incentives. To take a simple example, a department store under prior law could deduct the cost of a good at the time of sale, even though it included the customer's payments as received over some period of time. This deferral certainly reduced the effective tax paid by the department store, but it was not an incentive to expand inventories or any other real investment. Instead, this provision reduced the effective cost of the good sold and is best modeled as an output subsidy. Under tax reform, income from sales using the installment method must be recognized at the time of sale, rather that deferred as under prior law. Thus, an output or sales subsidy has been reduced. There has been

no direct change in the tax treatment of income from investment in real assets.

Second, tax reform also repeals provisions which allowed both financial and nonfinancial firms to accelerate the deduction of losses due to bad debts. This change reduces interest free loans from the government to the taxpayer, thus effecting the matching of income and expense. Again, however, these provisions are not associated with the incentives to make new real investment. For nonfinancial corporations, bad debt reserves are associated with their lending, usually to purchasers, and could thus be modeled as an output tax or subsidy. They are not associated with borrowing to buy new real investment. For financial corporations, bad debt reserves are associated with the provision of their output, financial services, and not with their own real investment (e.g., bank buildings and vaults). The only effect that these provisions might have on the cost of capital for new real investment is an indirect effect through raising the cost of financial services that might be a necessary component of financing and making new real investment. However, this indirect effect requires general equilibrium changes in output prices. (In this case the price of banks' output is the interest rate differential they charge.) Moreover, as noted in Neubig and Sullivan (1987, this volume), banks benefit from rate reduction so the net effect of tax reform on the price of financial services is ambiguous at best. It does not directly affect the tax treatment of income from our marginal real investment, and thus has no direct effect on investment incentives.

Changes in multi-period production accounting rules are projected to raise $35 billion in corporate revenue over the 1987-1991 period. In contrast to other accounting rule changes, these changes can affect investment incentives. This estimate includes some one-time revenue, however, so the effect on marginal investment incentives might be overstated by looking only at revenue estimates. Under the new rules, firms must capitalize into basis certain costs which previously could be expensed, such as some pension costs, accelerated depreciation, and general and administrative costs.

New "uniform" capitalization rules affect investment in inventory and self-constructed real estate. Data from a variety of sources (Commerce, IRS, and industry representatives) suggest that roughly 20 percent of the costs of inventory and self-constructed real estate is expensed under prior law. Revenue estimates suggest that tax reform would reduce this fraction to about 5 percent.

Data from similar sources suggest that in most industries perhaps 20 percent of structures investment is treated as self-constructed for tax purposes. In a few industries, however, such as utilities, casual evidence suggests that as much as 80 percent of structures might be considered self-constructed for tax purposes.

Tighter rules also apply to assets constructed under long-term contract. Prior law allowed use of the completed contract method of accounting for long-term contracts. Under this generous accounting system perhaps 10 percent

of costs could be expensed. Tax reform reduces expensible costs to perhaps 3 percent of contract costs. In addition tax reform requires that 40 percent of any long-term contract use the percentage of completion method, which provides proper income tax treatment for all expenditures. We thus assume that tax reform allows expensing of only 2 percent of costs associated with long term contracts.

We divide inventory into two components. The first component is affected by uniform capitalization rules. The second is affected by changes in accounting for long term contracts. Based on data from Standard and Poor's Industry Surveys, Construction Review, the Survey of Current Business, and unpublished Commerce surveys, we estimate that about 10 percent of our stock of inventories might be affected by accounting rules covering long- term contracts. We assume that the remaining 90 percent of inventory is affected by changes in uniform capitalization rules.

Table 5.14 shows how our modeling of multi-period accounting rules affects our results. For comparison purposes, the first two columns reproduce standard results from Table 5.6 for prior law and tax reform. For structures and inventory, expensing is more generous than regular tax treatment, and the next two columns show that our modeling of accounting rules lowers the effective tax rates on structures and inventory, compared to those obtained when these rules are ignored. As a consequence, neutrality is also slightly improved. (Equipment is affected because some real property is included in BEA definitions of equipment.)

Because tax reform tightens multi-period accounting rules, it raises effective tax rates by a slightly larger amount compared to prior law when such rules are modeled than it does when accounting rules are ignored. The overall average rate in the corporate sector rises by 5.7 percentage points (or 14.7 percent) when accounting rules are ignored, compared to a higher 7.7 percentage point (or 21.2 percent) rise when accounting rules are included. For the economy as a whole, with accounting rules the average effective tax rate rises by 4.4 percentage points (13.8 percent), instead of the 3.2 percentage point (9.6 percent) increase estimated when accounting rules are left out of the analysis. Thus, including accounting rules suggests that tax reform will cause a somewhat larger rise in effective tax rates than when these rules are ignored. Nonetheless, even with the accounting rule changes, tax reform encourages a more productive allocation of investment by evening the tax treatment of different investments.

IX. DISCUSSION

The cost of capital model we employ includes the effects of personal and corporate tax rates, ITCs, depreciation allowances, and multi-period accounting rules on investment incentives for a large number of depreciable assets, as well as land and inventories. Our modeling of depreciation allowances is more complete than elsewhere in the literature. However, further development

Table 5.14 **Accounting Rules for Multi-period Production***

	Without Accounting Rules		With Accounting Rules	
	Prior Law	Tax Reform	Prior Law	Tax Reform
Corporate Tax Rates				
Equipment	.100	.396	.095	.395
Structures				
Non-residential	.344	.431	.337	.430
Residential	.495	.525	.488	.524
Public Utility	.326	.445	.310	.442
Inventories	.488	.458	.440	.449
Land				
Non-residential	.506	.478	.506	.478
Residential	.539	.514	.539	.514
Overall	.387	.444	.363	.440
Noncorporate Tax Rates				
Equipment	-.119	.254	-.120	.254
Structures				
Non-residential	.278	.314	.273	.312
Residential	.382	.406	.377	.404
Public Utility	.221	.336	.217	.334
Inventories	.330	.305	.294	.297
Land				
Non-residential	.361	.338	.361	.338
Residential	.414	.395	.414	.395
Overall	.332	.339	.327	.337
Owner-Occupied Housing Tax Rate	.225	.237	.225	.237
Overall Tax Rate	.333	.365	.319	.363
Standard Deviation of Cost of Capital	.0150	.0114	.0135	.0111

Source: Authors' calculations as described in the text.

*Calculations assume $s=0.05$, $\pi=0.04$.

is possible. For example, we do not include the effect of the special treatment of farm structures and certain expensible assets used in mineral production. It would also be possible to include a more complete modeling of financial institutions. Furthermore, other statutory provisions, such as the treatment of pollution control equipment, are ignored. Finally, we do not attempt to model passive loss rules, the alternative minimum tax, or the tax treatment of research and development.

In addition, there are problems with the basic model itself. For example, it may be inappropriate to ignore risk, as we do in this perfect certainty model. In addition, it might be said that there are inherent inconsistencies in our modeling. Firms are assumed to minimize taxes by using the most generous depreciation allowances and LIFO inventory accounting. However, they use both debt and equity financing when debt is always cheaper. These issues await further analysis, but they imply that the numerical results in this paper need to be interpreted in the context of the type of model used to generate them.

Overall, our results suggest that tax reform will cause a slight increase in effective tax rates. However, due in large part to ITC repeal and corporate rate reduction, the relative tax treatment of different assets and investors is improved. Thus, a more efficient allocation of investment is likely to result.

FOOTNOTES

[1] Accounting rules are considered in Section VIII below. The model ignores changes in the minimum tax, passive loss rules, and the treatment of research and development.

[2] See Fullerton (1987) for more on firm arbitrage.

[3] For a variety of reasons not captured here, firms may not always minimize their taxes by taking the earliest possible deductions. In order to concentrate on the tax wedge and to insure comparability across tax regimes, however, calculations here assume tax minimizing behavior, including use of LIFO methods for inventory accounting.

[4] This is especially true for calculations based on the assumption of firms arbitrage. With that arbitrage assumption, personal taxes are not fully reflected in the cost of capital, but are fully reflected in the effective tax rate.

[5] Gravelle (1982) assumes that all is by corporations, and Auerbach (1983b) explicitly considers only the corporate sector.

[6] The algorithm also allows for the classification of assets, especially real property, which do not have ADR midpoint lifetimes.

[7] The capital stocks are computed using the perpetual inventory method.

[8] These nonneutralities are due to deviations of total cost recovery allowances from economic depreciation. Thus, the ITC also contributes to these inefficiencies.

[9] Certain industry specific features of the tax code are not accounted for in our modeling. For example, we ignore the special tax treatment of farm structures and petroleum mining shafts and wells.

[10] The International Trade Commission's study also differs from ours by using investment flows rather than (the more appropriate) capital stocks as weights in aggregating up to industry and sectoral levels.

[11] We do not consider any induced change in income tax rates at the state level. Thus, to the extent that states lower their statutory income tax rates in response to federal base broadening, our estimates overstate effective tax rates under tax reform.

[12] See Cilke and Wyscarver (1987, this volume) for more detail on this model.

[13] Fullerton, Henderson, and Mackie (1987, this volume) also provide a detailed description of these adjustments.

[14] For debt financed investment, corporate rate reduction can increase the cost of capital and effective tax rate, as discussed below.

[15] The standard deviation in the cost of capital is not a perfect measure to use in comparing dispersion across tax regimes. It does not adjust for differences in scale, as for example, the coefficient of variation does. In addition, it does not measure the welfare cost due to nonneutralities. Nonetheless, for the results in our paper, a lower standard deviation is associated with a lower coefficient of variation (except in one case that is noted) so the standard deviation provides relevant information on dispersion.

[16] An interesting side point illustrated by Table 5.8 is that for prior law it is the ITC, as opposed to accelerated depreciation, which gives a tax advantage to investment in equipment relative to nonresidential structures. Without the ITC, the effective tax rate on equipment is

larger than the effective tax rate on nonresidential structures. However, comparing our results to those in Fullerton (1987) suggests that this conclusion might depend on arbitrage assumptions.

[17] For corporate investment financed entirely through new share issues, tax reform reduces the overall average effective tax rate in the corporate sector from 67 percent to 61 percent. If corporate equity is obtained equally from new share issues and retained earnings, and one-third of all investment is debt financed, then the overall average effective tax rate on investment in the corporate sector rises only modestly from 47.4 percent under prior law to 47.9 percent under tax reform (see Table 5.11 below).

[18] This is also true for some unenacted proposals. For example, Fullerton (1987) finds that, compared with prior law, the President's proposal would reduce the overall average effective tax rate in the corporate sector under individual arbitrage, but increase it under firm arbitrage.

[19] The new view received empirical support in Auerbach (1984), but the old view was found more compatible with historical evidence in Poterba and Summers (1983, 1985).

[20] In equation (5.2), under the old view c_d is .333, c_{re} is .333, and c_{ns} is .333.

[21] See Brookes (1986) as well as Henderson (1986).

[22] See Fullerton (1987) for the modeling of the indexation of capital gains.

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