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Chapter Author: Don Fullerton, Yolanda Kodrzycki Henderson

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13 The Impact of Fundamental Tax Reform on the Allocation of Resources

Don Fullerton and Yolanda Kodrzycki Henderson

In the fall of 1984, the United States Treasury Department advanced a proposal for fundamental tax reform. The changes in investment incentives were designed to enhance fairness and economic growth. The Treasury Department's plan took large steps toward defining the tax base as economic income, and taxing that base at lower rates. Compared to current law, it was argued that the proposed code would tax more uniformly the returns from alternative assets, sectors, and industries. This more even-handed treatment would produce incentives for a superior mix of investment, which would in turn increase national output. A subsequent proposal by the president and legislation passed by the House of Representatives changed the specific features of tax reform, but they were motivated by the same general principles.[1]

During the continuing debate on fundamental tax reform, several issues have been raised with respect to the treatment of capital income. First, it has been asked whether the rate reduction is enough to offset the more comprehensive base for the tax on corporate income. Higher effective tax rates in the corporate sector might reduce corporate investment and exacerbate misallocations between the corporate sector

Don Fullerton is an associate professor of economics at the University of Virginia. Yolanda Kodrzycki Henderson is an economist at the Federal Reserve Bank of Boston.

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and the noncorporate sector. Second, there has been concern that tax reform proposals leave largely unchanged the treatment of owner-occupied housing. Under current law, the returns to housing escape federal taxation while mortgage interest payments are deductible. It has been asked whether it is possible to achieve significant reform if we maintain this favorable treatment for housing relative to business capital.

Third, and related to the first two points, the magnitude of the improvements in the allocation of investment within the corporate sector has been questioned. Efficiency might increase from making more equal the tax treatment across different assets such as equipment, structures, inventories, and land. Yet this gain may or may not be enough to offset diminished efficiency from unchanged or worsened disparities across sectors.

Fourth, if tax reform does raise total taxes on income from capital, any gains from a more level playing field might be offset by losses resulting from reduced investment.

Finally, there has been general interest in how tax reform would affect different parts of the economy. Observers would like to know which industries and sectors might be expected to expand or contract.

This paper develops a framework to provide information on all of these important issues. We examine the original Treasury Department proposal and the later proposal submitted to the Congress by the president. We start in section 13.1 by measuring the impact of these plans on capital costs and effective tax rates. Our measures are appropriate for prospective investments, and they take into account the tax treatment of various assets, sectors, and industries. In section 13.2, we describe a general equilibrium simulation model that can evaluate the long-term consequences of tax reform. This model can trace the expected reallocation of resources as well as measure aggregate changes in the economy. Section 13.3 presents our simulation results in detail, and section 13.4 summarizes our conclusions. While this paper contains a comprehensive model of investment incentives, it does not provide information about the effects of tax reform on equity, simplicity, or other criteria essential to final policy judgments.

13.1 Administration Tax Reform Proposals, 1984–85

The Reagan administration has developed two sets of proposals for tax reform. The first was the November 1984 report of the Treasury Department to the president, entitled *Tax Reform for Fairness, Simplicity, and Economic Growth*. It was followed by *The President's Tax Proposals to the Congress for Fairness, Growth, and Simplicity* (May 1985). These will be referred to as the "Treasury plan" and the "pres-

ident's plan," respectively. These proposals include pervasive changes to the tax code, but this paper concentrates on provisions that would affect taxes on income from capital. These include: (1) lower statutory rates, as evidenced in the reduction of the top corporate rate from 46 to 33% and the reduction of personal rates to three brackets of 15, 25, and 35%;[2] (2) revised capital cost recovery provisions, including the repeal of the investment tax credit and indexation of depreciation allowances; and (3) changed treatment of dividends, capital gains, and interest income and expense.

This section measures the investment incentives arising from the changes proposed by the administration, and compares them to incentives under current law. Our model of investment incentives is based on Fullerton (1985). The resulting costs of capital are then used as inputs for the general equilibrium model outlined in section 13.2.

13.1.1 A Model of Investment Incentives

To derive a user-cost-of-capital formula like that of Hall and Jorgenson (1967), consider a perfectly competitive firm contemplating a new investment in a world with no uncertainty. Assume the firm has sufficient tax liability to take associated credits and deductions, and that it does not resell the asset.[3] The acquisition cost is q, but an investment tax credit at rate k reduces the net cost of the asset to $q(1 - k)$. The rental return on this asset starts at level c, increases at the constant inflation rate π, and decreases because of constant exponential depreciation of the asset at rate δ. Local property tax at rate w is paid on the asset's value at any point in time, and the return net of property tax is subject to the corporate income tax at statutory rate u. These net returns are discounted at the firm's nominal after-tax discount rate r. The present value of depreciation allowances per dollar of investment is z, so the present value of savings is uzq.[4] In equilibrium, then, the net outlay must be exactly matched by the present value of net returns:

$$(1) \qquad q(1 - k) = \int_0^\infty (1 - u)(c - wq)e^{(\pi-\delta)t}e^{-rt}dt + uzq$$

This expression can be integrated and solved for the rental rate c/q. Subtraction of δ provides ρ^c, the real social return in the corporate sector, gross of tax but net of depreciation:

$$(2) \qquad \rho^c = \frac{r - \pi + \delta}{1 - u}(1 - k - uz) + w - \delta$$

In calculations below, common values are used for r, π, and u, but each asset has a specific value for δ, k, z, and w.

If u and the corporate discount rate are replaced by the noncorporate entrepreneur's personal marginal tax rate, τ_{nc}, and corresponding discount rate, then (2) gives an analogous expression for ρ^{nc}, the social rate of return in the noncorporate sector. Finally, owner-occupied housing receives no credit or depreciation allowances. A fraction λ of property taxes is deducted at the homeowner's personal marginal tax rate τ_h, and the imputed return is not taxed. Use of the homeowner's discount rate and an equilibrium condition similar to (1) provides ρ^h, the social rate of return to owner-occupied housing:

$$\rho^h = r - \pi + (1 - \lambda\tau_h)w. \tag{3}$$

To compute the rates of discount in each sector, we first assume that individuals hold debt and equity issued by all three sectors, and that they arbitrage away any differences in net rates of return. Suppose i is the nominal interest rate, τ_d is the debtholder's personal marginal tax rate, and f is the fraction of nominal interest that is taxed (and of nominal interest that is deducted.)[5] Then, under our arbitrage assumption, all assets must provide the real net return that individuals could earn on their debt holdings:

$$s = i(1 - \tau_d f) - \pi. \tag{4}$$

Here, s represents the net-of-all-tax return in the corporate, noncorporate, and owner-occupied housing sectors. In our computations, we start with an assumption on s and calculate i for all sectors from equation (4) as $(s + \pi)/(1 - \tau_d f)$.

The computation of discount rates then involves examining separately each sector and source of finance—debt, retained earnings, and new share issues. (We assume that the financial decision is exogenous.) The corporation's discount rate for debt is simply the net-of-corporate-income-tax rate of return: $r = i(1 - uf)$. For retained earnings, the individual's nominal net return must match $i(1 - \tau_d f)$. The investment earns a nominal net-of-corporate-tax return r and the resulting share appreciation is taxed at the accrued personal capital gains rate τ_{re}. Also, let $\gamma = 1$ if the system taxes only real capital gains, and $\gamma = 0$ if it taxes nominal gains. Then the return r must be such that $r(1 - \tau_{re}) + \tau_{re}\pi\gamma = i(1 - \tau_d f)$. The solution for r provides the requisite discount rate. For new shares, we assume that each dollar of after-corporate-tax return could instead be distributed as θ dollars of dividends.[6] This dividend is subject to personal taxes at rate τ_{ns}. Thus, new share issues must earn an r such that $r\theta(1 - \tau_{ns}) = i(1 - \tau_d f)$. The corporation's single discount rate is a weighted average of these three discount rates:

$$c_d\left[i(1 - uf)\right] + c_{re}\left[\frac{i(1 - \tau_d f) - \tau_{re}\pi\gamma}{(1 - \tau_{re})}\right] + c_{ns}\left[\frac{i(1 - \tau_d f)}{\theta(1 - \tau_{ns})}\right], \tag{5}$$

where c_d, c_{re}, and c_{ns} are the proportions of new investment financed by debt, retained earnings, and new shares, respectively.

In the noncorporate sector, recall that τ_{nc} represents the marginal tax rate of entrepreneurs. Then, the noncorporate firm's debt costs $i(1 - \tau_{nc}f)$, and its equity must earn $i(1 - \tau_d f)$ after taxes, because of individual arbitrage. Its overall discount rate is thus:

$$(6) \qquad n_d[i(1 - \tau_{nc}f)] + n_e[i(1 - \tau_d f)],$$

where n_d and n_e represent the shares financed by debt and equity, respectively. For homeowners, τ_h is the marginal tax rate, and a similar logic provides their discount rate:

$$(7) \qquad h_d[i(1 - \tau_h)] + h_e[i(1 - \tau_d f)].$$

All of mortgage interest is deducted, but only f of other interest income is subject to tax. The parameters h_d and h_e are the respective debt and equity shares.[7]

Although investment incentives are properly measured by the marginal product of capital, ρ, we present many of our results in terms of marginal effective total tax rates. These tax rates are the difference between the pre- and post-tax rates of return, as a proportion of the pre-tax rate of return:

$$(8) \qquad t = \frac{\rho - s}{\rho}.$$

Because s is the return net of all taxes, this effective rate reflects the combined impact of corporate taxes, property taxes, and personal taxes. It shows the portion of capital costs attributable to taxes. The reason for looking at effective tax rates is that they are easily interpreted. For example, the effective rate can be compared with the statutory corporate rate, or with the zero rate that would apply in the case of a consumption tax. With s constant throughout the economy, t varies monotonically (but nonlinearly) with ρ: assets or industries or sectors with higher effective tax rates also face higher required gross rates of return for investment.

13.1.2 Alternative Tax Laws

The above framework is useful to sort out the net impact of statutory tax rates, cost recovery provisions, and other rules affecting interest, dividends, and capital gains. This section proceeds to discuss values for the parameters necessary to implement that framework, for current law and for the two Administration proposals.

Statutory tax rates

For current law, we use the top federal statutory rate of .46 for marginal corporate income. The weighted average of states' top-bracket

rates has been estimated to be .0655 by King and Fullerton (1984, p. 204). Accounting for the deductibility of state taxes at the federal level, the appropriate value for u is .46 + .0655(1 − .46), which equals 49.5%. The Treasury Department and president's proposals would set a top federal rate of .33 and maintain the deductibility of state corporate taxes. For these reforms, u is thus 37.4%.

Turning to the personal level, we require marginal tax rates for interest income (τ_d), dividend income (τ_{ns}), capital gains (τ_{re}), noncorporate income (τ_{nc}), and interest deductions for owner-occupied housing (τ_h). The marginal investment under consideration is an equiproportionate increase in all capital stocks, with an equiproportionate increase in the holdings of all investors. Additional debt and interest income, for example, would be distributed among debtholders in proportion to their current debt and interest income. The appropriate marginal tax rate is thus the average of all debtholders' marginal rates, weighted by their interest income. We include both federal and state taxes. Furthermore, these rates must reflect the proportions of income received directly by households and the proportions received indirectly through institutions such as nonprofit organizations and life insurance companies.

For households, federal tax rates were calculated by Lawrence Lindsey using the TAXSIM model of the National Bureau of Economic Research.[8] The computed rate for housing interest deductions under current law is 25.0%. The rates for interest recipients (27.8%) and rate for dividend recipients (33.9%) indicate that they are on average in higher brackets than homeowners. The 26.1% capital gains rate reflects the full taxation of realized gains, and the 19.5% noncorporate rate reflects the low brackets of many proprietors and partners with losses for tax purposes. All of these personal tax rates would be reduced by the administration proposals. The TAXSIM calculations are available only for the Treasury plan, but the three brackets for the president's plan are very similar. Since these two plans would reduce the top rate bracket proportionately more than other brackets, they would reduce the weighted average rate on dividends and capital gains proportionately more than the rates on other forms of income. The resulting marginal rates were calculated to be: 21.0% for housing deductions; 21.9% for interest received; 26.2% for dividends; 20.8% for capital gains; and 15.8% for noncorporate income.

In order to include state income taxes, 5 percentage points are added to each federal rate under current law.[9] This percentage reflects the weighted average of the different states' rates, and the deductibility of state taxes at the federal level for those who itemize. Six percentage points are added to the rates for the administration proposals to reflect the repeal of deductibility.

The personal rate on interest is then adjusted to account for the taxation of banks, as described in King and Fullerton (1984, pp. 223–26). The resulting rate for households must then be averaged with a zero rate for the interest income of nonprofit institutions, and a .368 rate for the interest income of life insurance companies. This latter rate reflects their 46% statutory rate and their 20% deduction for reserves under current law. The final estimate for τ_d is 23.1%. The same average under the administration proposals is 20.5%.

The household rate on dividends is similarly raised to account for state taxes and reduced to account for the dividends received by tax-exempt institutions and insurance companies. The resulting value for τ_{ns} is .292 under current law and .242 under the administration proposals. The noncorporate rate is raised by state taxes, but not reduced by any holdings of institutions. It is .245 and .218 under current law and the proposals, respectively. The final rates for capital gains (.052 and .105, respectively) are discussed below.

The weighted average rate for mortgage interest deductions is .25 at the federal level, raised to .30 to account for state taxes. The TAXSIM model indicates that about 70% of household real property taxes are deducted. Thus τ_h and λ are .30 and .7, respectively. The proposals would reduce this personal rate to .27 and eliminate deductibility of property taxes ($\lambda = 0$). The final vectors of personal tax rates are summarized in table 13.1.

Table 13.1 Personal Tax Rate Parameters

Type of Income	1985 Law	Administration Plans
Interest Received	.231	.205
Dividends Received	.292	.242
Capital Gains	.052	.105[a]
Noncorporate Income	.245	.218
Housing Deductions	.300	.270

[a]This rate reflects full taxation of real capital gains after deferral.

Capital cost recovery

Potential for nonneutralities arises because different assets depreciate at many different rates, while tax codes tend to simplify by grouping assets into a few categories for depreciation allowances. In order to capture these nonneutralities, it is important to include many diverse assets in the model. Table 13.2 lists the 35 depreciable assets used in this study, including 20 kinds of equipment and 15 types of structures.

Table 13.2 **Tax Parameters for Each Asset**[a]

		Economic Depreciation Rate[b]	ACRS Tax Lifetime	RCRS Close-out Year	CCRS Close-out Year	Current Law Investment Tax Credit
1	Furniture and Fixtures	.110	5	17	7	.10
2	Fabricated Metal Products	.092	5	17	7	.10
3	Engines and Turbines	.079	5	25	10	.10
4	Tractors	.163	5	12	6	.10
5	Agricultural Machinery	.097	5	17	7	.10
6	Construction Machinery	.172	5	12	6	.10
7	Mining and Oil Field Machinery	.165	5	12	6	.10
8	Metalworking Machinery	.123	5	17	7	.10
9	Special Industry Machinery	.103	5	17	7	.10
10	General Industrial Equipment	.123	5	17	7	.10
11	Office and Computing Machinery	.273	5	8	5	.10
12	Service Industry Machinery	.165	5	12	6	.10
13	Electrical Machinery	.118	5	17	7	.10
14	Trucks, Buses, and Trailers	.254	5	8	5	.10
15	Autos	.333	3	5	4	.06
16	Aircraft	.183	5	12	6	.10

17	Ships and Boats	.075	5	25	10	.10
18	Railroad Equipment	.066	5	25	7	.10
19	Instruments	.150	5	12	6	.10
20	Other Equipment	.150	5	17	7	.10
21	Industrial Buildings	.036	18	63	28	.00
22	Commercial Buildings	.025	18	63	28	.00
23	Religious Buildings	.019	18	63	28	.00
24	Educational Buildings	.019	18	63	28	.00
25	Hospital Buildings	.023	18	63	28	.00
26	Other Nonfarm Buildings	.045	18	63	28	.00
27	Railroads	.018	15	38	10	.10
28	Telephone and Telegraph	.033	15	38	10	.10
29	Electrical Light and Power	.030	15	38	10	.10
30	Gas Facilities	.030	10	38	10	.10
31	Other Public Utilities	.045	10	38	10	.10
32	Farm Structures	.024	18	63	28	.00
33	Mining, Shafts and Wells	.056	5	63	28	.00
34	Other Nonbuilding Facilities	.029	18	63	28	.00
35	Residential Structures	.015	18	63	28	.00

[a]For the case of 4% inflation and a 4% net rate of return.

[b]Economic depreciation rates come from Hulten and Wykoff (1981), and for assets 27–31, from Jorgenson and Sullivan (1981).

The economic depreciation rates δ are estimated by Hulten and Wykoff (1981) and shown in the first column of table 13.2. These range from a high of .333 for autos to a low of .015 for residential buildings. We also include inventories and land in our study, but these are assumed not to depreciate, and they do not receive any depreciation allowances.

The second column of table 13.2 shows the lifetimes currently available under the accelerated cost recovery system (ACRS). Autos are depreciated over 3 years, other equipment over 5 years, public utility structures over 10 or 15 years, and other structures over 18 years. Allowances over these lifetimes can be read from tables in the law. In effect, equipment and public utilities receive allowances based on 150% of declining balance with a switch at the optimal time to straight line. The depreciation basis is reduced by half the investment tax credit. Other structures receive allowances based on 175% of declining balance with an optimal switch to straight line.

At zero inflation, these allowances are high relative to economic depreciation. They are fixed in nominal terms, however, so that at moderate inflation rates, their real present value may be less than that of economic depreciation. We use a nominal discount rate in calculating z to account for the fact that allowances are based on historical cost. The exact formula is shown in King and Fullerton (1984, p. 211).

The Treasury proposes to set allowances as closely as possible to estimates of economic depreciation (i.e., indexed for inflation). In fact, for their real cost recovery system (RCRS), they use the Hulten-Wykoff estimates to group together similar assets into 7 classes. Each class has an exponential rate for allowances and a "close-out" year in which all remaining basis may be deducted. We use a real discount rate to capture the indexing of allowances. The Treasury's grouping of assets is indicated by the close-out years shown in column 3 of table 13.2 (see *Tax Reform for Fairness, Simplicity, and Economic Growth*, p. 161). These allowances closely match the estimated real rates of depreciation. Since all remaining basis is deducted in the close-out year, however, allowances are slightly accelerated relative to the estimated exponential rates. Moreover, this near neutrality may be misleading to the degree that allowances were designed to reflect these particular estimates of economic depreciation. If δ are mismeasured in some way, then marginal effective tax rates are mismeasured.

The president proposes a capital cost recovery system (CCRS) with 6 asset classes, higher exponential allowances, a switch to straight line at the optimal time, and indexation for inflation. Deductions are not bunched in the close-out year as in RCRS. Our calculations use the formula on page 211 of King and Fullerton (1984), with a real discount rate. The groupings of assets under the president's plan are indicated

by the close-out years in column 4 of table 13.2 (see *The President's Tax Proposals to the Congress for Fairness, Growth, and Simplicity*, p. 145).

The other aspect of capital cost recovery is the investment tax credit. Current law provides a 6% credit for automobiles, a 10% credit for other equipment, a 10% credit for public utility structures, and no credit for buildings. These rates are shown in column 5 of table 13.2. Both the Treasury and the president's plan would repeal these credits.

Provisions for capital gains, interest, and dividends

In addition to indexing depreciation allowances, both proposals include provisions to index capital gains. The Treasury plan would further index interest income and expense. This subsection describes these and other innovative features such as the fractional deduction for dividends paid by corporations.

With respect to capital gains, the advantage of deferral cuts the effective rate of tax approximately by half.[10] Current law also excludes 60% of realized long-term gains. Even after adding state taxes, the effective rate on accruals is 6% for households, and it is 5.2% after accounting for tax-exempt institutions and insurance companies. On the other hand, current law taxes nominal capital gains ($\gamma = 0$). The Treasury proposal would lower personal rates and index for inflation, but it would fully tax real gains when realized. After state taxes, halving for deferral, and averaging with institutions, τ_{re} would be .105 (with $\gamma = 1$). The effect of this change can be seen in equation (5). The president's plan taxes 50% of nominal gains at reduced personal rates, so τ_{re} is 5.6%. After 1991, however, the investor can choose indexation in place of the exclusion. For any given inflation rate, our model calculates whether this option would be taken. In particular, if $s = .04$, indexation is preferred to the exclusion if π exceeds .04.

Nominal interest income currently is taxed in the United States, and so f is set to one. In fact, the world has very little experience with attempts to index income, especially interest income. The Treasury recognizes the administrative difficulties of trying to measure real interest income or expense, and so it suggests a more practical procedure that is intended to have approximately the same effect. By knowing the inflation rate π, and assuming a 6% real return at the outset, it can estimate the inflationary portion of the nominal interest as $\pi/(.06 + \pi)$. With 4% inflation, for example, the excluded part is .4, and f is set to .6 in equations (4)–(7). All of mortgage interest is still deductible. The president's plan would not index interest income or expense.

The two administration proposals introduce partial integration of personal and corporate taxes by allowing firms to deduct part of div-

idends paid. Currently, if the corporation gives up a dollar of retentions, it is able to pay one dollar of dividends gross of personal taxes. Thus θ is one. Suppose instead that a fraction g of dividends is deductible against the corporate tax. The dollar of retentions corresponds to $1/(1 - u)$ dollars of before-tax earnings. If these earnings were paid out in an amount θ of dividends instead of being retained, then corporate tax payments would equal $u[1/(1 - u) - g\theta]$. The after-tax return available for dividends would thus be $\theta = [1/(1 - u)] - u\ [1/(1 - u) - g\theta]$, simplified as $\theta = 1 + gu\theta$. This equation implies $\theta = 1/(1 - gu)$. With $u = .374$ and half of dividends deductible under the Treasury proposal, θ would be 1.230. With a 10% deduction under the president's plan, θ is 1.039. The effect of such a change is that the firm does not need to earn as much to provide the required after-tax return to the saver (see equation (5)).

Other data

For local property tax rates (w), we use the same parameters under all three tax regimes. Assuming that new investments will pay the same property tax on average as existing investments, data in Fullerton and Henderson (1984) indicate rates of .00768 for equipment and inventories, .01126 for business land and structures, .01550 for public utilities, and .01837 for residential land and structures.

Our initial assumption is that new investments have sources of finance in the same proportions as existing investments. Following King and Fullerton (1984, p. 239), we find that corporations finance 33.7% by debt, 61.4% by retentions, and 4.9% by new shares. Following Fullerton and Henderson (1984), we assume that noncorporate firms and homeowners also finance a third of their investments by debt and two-thirds by equity.

We take the inflation rate, π, and the baseline net-of-all-tax rate of return, s, each to be 4%. Solving equation (4) with these assumptions and $\tau_d = .231$, we find that i for current law equals .104. If s did not change under the Treasury or president's plans, i would be .091 or .101, respectively.

13.1.3 Effective Tax Rate Results

This section first concentrates on the incentives to invest in different assets. We then aggregate assets to reflect investment incentives at the industry and sector levels.

Table 13.3 presents allowances and marginal effective total tax rates for 36 assets in the corporate sector. Under current law, the first 20 assets—types of equipment—have very low tax rates or are even subsidized. These effective tax rates range from -4 percent to $+3$ percent, despite the fact that we are including taxation at both the personal and

Table 13.3 **Investment Incentives for Each Asset in the Corporate Sector**

		Present Value of Allowances (z)			Marginal Effective Total Tax Rates (t)		
		Current Law	Treasury Plan	President's Plan	Current Law	Treasury Plan	President's Plan
1	Furniture and Fixtures	.812	.769	.891	.019	.416	.280
2	Fabricated Metal Products	.812	.769	.891	.025	.393	.264
3	Engines and Turbines	.812	.685	.855	.029	.429	.286
4	Tractors	.812	.834	.920	.002	.411	.280
5	Agricultural Machinery	.812	.769	.891	.024	.400	.269
6	Construction Machinery	.812	.834	.920	−.001	.418	.286
7	Mining and Oil Field Machinery	.812	.834	.920	.001	.412	.281
8	Metalworking Machinery	.812	.769	.891	.015	.430	.290
9	Special Industry Machinery	.812	.769	.891	.022	.407	.274
10	General Industrial Equipment	.812	.769	.891	.015	.430	.290
11	Office and Computing Machinery	.812	.877	.939	−.036	.435	.302
12	Service Industry Machinery	.812	.834	.920	.001	.412	.281
13	Electrical Machinery	.812	.769	.891	.017	.425	.286
14	Trucks, Buses, and Trailers	.812	.877	.939	−.029	.423	.293
15	Autos	.812	.915	.952	−.021	.401	.292
16	Aircraft	.812	.834	.920	−.005	.428	.293
17	Ships and Boats	.812	.685	.855	.031	.423	.282
18	Railroad Equipment	.812	.685	.891	.033	.409	.241

(*continued*)

Table 13.3 (continued)

		Present Value of Allowances (z)			Marginal Effective Total Tax Rates (t)		
		Current Law	Treasury Plan	President's Plan	Current Law	Treasury Plan	President's Plan
19	Instruments	.812	.834	.920	.006	.399	.272
20	Other Equipment	.812	.769	.891	.006	.459	.312
21	Industrial Buildings	.607	.436	.617	.458	.480	.398
22	Commercial Buildings	.607	.436	.617	.423	.453	.374
23	Religious Buildings	.607	.436	.617	.404	.438	.360
24	Educational Buildings	.607	.436	.617	.404	.438	.360
25	Hospital Buildings	.607	.436	.617	.419	.450	.371
26	Other Nonfarm Buildings	.607	.436	.617	.483	.501	.417
27	Railroads	.604	.571	.855	.339	.431	.317
28	Telephone and Telegraph	.604	.571	.855	.370	.462	.332
29	Electric Light and Power	.604	.571	.855	.364	.456	.329
30	Gas Facilities	.699	.571	.855	.297	.456	.329
31	Other Public Utilities	.699	.571	.855	.314	.483	.343
32	Farm Structures	.607	.436	.617	.420	.451	.371
33	Mining, Shafts and Wells	.865	.436	.617	.316	.523	.437
34	Other Nonbuilding Facilities	.607	.436	.617	.437	.464	.383
35	Inventories	—	—	—	.481	.442	.418
36	Land	—	—	—	.504	.468	.447

corporate levels.[11] Equipment has these low effective tax rates because of investment tax credits and because of depreciation allowances in excess of economic depreciation. Structures (assets 21–26, 32–34) face considerably higher tax rates, between 32 and 48%, because they are not eligible for the investment tax credit and because of their less generous depreciation allowances. Public utility structures (assets 27–31) have tax rates that are not quite as high as those for most other structures, since they receive a 10% investment tax credit. The highest tax rates are those for inventories (48%) and land (50%). These rates are not reduced by any credits or depreciation deductions.

The Treasury plan eliminates most disparities in tax rates among assets. It rescinds the investment tax credit and provides depreciation allowances that are close to economic depreciation. Any remaining differences are due solely to differential property taxes and to slight variations in depreciation treatment. Effective tax rates in the corporate sector all lie between 39 and 52%. The generally higher level of these rates is due in part to the changes in capital cost recovery provisions, but also to changes in the treatment of interest income and expense. Currently, investments financed by debt are subsidized in that interest payments are deducted by corporations at a 49.5% rate, and included in taxable income of debtholders at an average marginal rate of 23.1%. The difference between 49.5% and 23.1% is a 26.4 percentage-point subsidy that is lowered by the Treasury plan to 16.9 percentage points (interest deductions are made at a 37.4% rate while interest income is taxed at a 20.5% rate). Furthermore, the Treasury plan indexes interest deductions and receipts, so that this subsidy would apply to only the fraction that reflects real interest. The application of the subsidy rate to a lower base is yet another reason for higher effective tax rates on debt-financed investments under the Treasury plan.

The president's plan would reduce the disparities among tax rates for different assets, but not as much as the Treasury plan. The investment tax credit would still be eliminated, but depreciation deductions would be accelerated relative to economic depreciation. These depreciation provisions introduce some disparities in the treatment of assets relative to the Treasury plan. Equipment would be taxed at a lower effective rate than structures. Accelerated depreciation also provides for preferential taxation of depreciable assets relative to inventories and land. As well, the president's plan reduces the number of classes of assets from 10 to 6. It might therefore introduce disparities among effective tax rates of individual assets. Finally, in table 13.3, tax rates are generally lower than those in the Treasury plan because interest is no longer indexed. Compared to current law, effective tax rates rise for equipment but fall for structures. These tax rates range from 24 to 42%. The tax rates for inventories and land remain on the order of 40%.

Next, table 13.4 shows marginal effective tax rates by industry. Tax rates for individual assets were aggregated using estimates of the 1984 stock of each asset used in each industry.[12] Under current law, these industry rates range from 25.5% for utilities and 27.8% for real estate to 42.9% for transportation equipment. The low rate for real estate reflects the favorable treatment of owner-occupied housing, which represents about three-quarters of that industry's capital stock. Utilities make extensive use of investment tax credits. Generally, manufacturing industries face effective tax rates that are higher than average, because they are heavily corporate. For the Treasury plan, real estate remains low at 29.7% because owner-occupied housing retains most aspects of its preferential treatment. Agriculture remains at 35.3% because of the high proportion of noncorporate enterprise. All other industries' rates are between 37 and 46%. Effective rates under the president's plan range from 31.3% (real estate) to 39.6% (transportation equipment). Whereas the Treasury plan had no industry's effective tax rate lower than under current law, the president's plan lowers rates for half the industries in our study. Overall, the president's plan is more successful at narrowing the differences among effective rates across industries, despite the Treasury's relative success at narrowing the effective tax rate across assets.[13] The reason for this apparent contradiction lies in table 13.5.

Table 13.4 **Marginal Effective Total Tax Rates for Each Industry**

Industry		Current Law	Treasury Plan	President's Plan
1	Agriculture, Forestry and Fisheries	.353	.353	.345
2	Mining	.294	.417	.336
3	Crude Petroleum and Gas	.348	.463	.391
4	Construction	.366	.405	.365
5	Food and Tobacco	.397	.442	.383
6	Textiles, Apparel and Leather	.385	.435	.376
7	Paper and Printing	.338	.435	.360
8	Petroleum Refining	.413	.454	.389
9	Chemicals and Rubber	.329	.434	.358
10	Lumber, Furniture, Stone, Clay and Glass	.363	.435	.369
11	Metals and Machinery	.394	.443	.383
12	Transportation Equipment	.429	.445	.396
13	Motor Vehicles	.349	.442	.369
14	Transportation, Communication and Utilities	.255	.431	.318
15	Trade	.410	.410	.378
16	Finance and Insurance	.358	.369	.337
17	Real Estate	.278	.297	.313
18	Services	.244	.382	.314
	Total	.331	.372	.342

Table 13.5 **Investment Incentives with New View of Dividend Taxes**

	Current Law		Treasury Plan			President's Plan		
	ρ	*t*	ρ	% change	*t*	ρ	% change	*t*
Corporate Sector								
Equipment	.040	.010	.069	(+70.5%)	.419	.056	(+37.9%)	.282
Nonresidential Structures	.069	.423	.077	(+10.8%)	.480	.066	(−4.3%)	.398
Public Utility Structures	.061	.348	.074	(+20.1%)	.457	.060	(−2.6%)	.329
Inventories	.077	.481	.072	(−7.0%)	.442	.068	(−10.9%)	.418
Land	.081	.504	.075	(−6.8%)	.468	.072	(−10.4%)	.447
Total	.064	.372	.072	(+12.7%)	.446	.064	(+0.3%)	.374
Noncorporate Business Sector								
Equipment	.034	−.181	.057	(+68.1%)	.298	.052	(+53.4%)	.231
Nonresidential Structures	.059	.322	.062	(+4.7%)	.353	.058	(−1.2%)	.314
Public Utility Structures	.055	.267	.064	(+16.5%)	.371	.058	(+6.2%)	.310
Residential Structures	.065	.386	.067	(+2.5%)	.400	.064	(−1.8%)	.374
Inventories	.060	.334	.059	(−2.5%)	.317	.058	(−2.8%)	.314
Nonresidential Land	.064	.371	.062	(−2.4%)	.356	.062	(−2.8%)	.353
Residential Land	.071	.434	.069	(−2.1%)	.422	.069	(−2.4%)	.420
Total	.061	.347	.062	(+2.0%)	.359	.061	(−0.3%)	.344
Owner-Occupied Housing	.052	.232	.054	(+3.5%)	.257	.056	(+7.9%)	.288
Average Overall Cost of Capital	.060		.064	(+6.8%)		.061	(+1.7%)	
Standard Deviation	.012		.008			.005		
Average Overall Tax Rate	.331		.372			.342		
Interest Rate	.104		.091			.101		

Note: Numbers in parentheses are percentage changes from current law in the cost of capital (ρ).

Table 13.5 presents user costs and effective tax rates for the corporate, noncorporate, and owner-occupied housing sectors. These rates also are presented for several aggregated assets: equipment, residential and nonresidential structures, public utility property, inventories, and residential and nonresidential land.

Under current law, accelerated cost recovery provisions combine with nominal interest deductions to generate a low total tax rate in the corporate sector. Interestingly, the overall effective tax rate in the corporate sector is 37.2%, only 2.5 percentage points higher than the 34.7% effective rate in the noncorporate sector, and 14 points higher than the 23.2% rate on owner-occupied housing (attributable to property taxes). The Treasury Department plan actually increases the spread between the overall tax rate in the corporate sector and the overall rates in the other sectors. Less generous capital cost recovery and interest provisions raise the rate in the corporate sector by 7.4 percentage points. The effect of less generous cost recovery provisions is offset to a large degree in the noncorporate sector by the 3% reduction in the tax rate of proprietors and partners. For housing, the effective tax rate rises by 2.5 points, mainly as a result of the end of deductibility of property taxes. Under the president's plan, by contrast, unchanged corporate sector taxation together with an increase in housing sector taxes produce more equal rates across industries and across sectors.

Our discussion has covered the incentives to invest in different assets, industries, and sectors under each version of the tax code. Before turning to the simulation model, however, we discuss a critical assumption about dividend taxes that affects our evaluation of the administration's tax reform proposals.

13.1.4 Dividend Taxes: "New" vs. "Old" Views

The administration proposals lower the effective tax rate on corporate dividends. Under the Treasury plan, in calculating the base of the corporate tax, firms would be allowed to deduct 50% of dividends paid. Under the president's plan, the deduction would be 10%. Yet these changes have little effect on our results so far. Fullerton (1985) found, for example, that a 50% deduction by itself would lower the effective tax rate in the corporate sector by only 2 percentage points.

The reason for this relatively insignificant effect is that these results concentrate on incentives at the margin. When a firm considers financing a prospective investment by retaining earnings, it necessarily delays a dividend. It may be shown that dividend taxes do not affect the rate of return on such an investment, since they affect symmetrically the dividend foregone initially and the dividend paid out later.[14] In the case of new share issues, on the other hand, there are no foregone

dividends when the firm finances a capital investment. The personal tax rate on dividends, τ_{ns}, and the fraction of dividends deducted, g, still affect the later returns to shareholders. Because of this asymmetry, these dividend tax parameters do enter the discount rate for new share issues in equation (5).[15]

Our initial calculations assume that marginal investments are financed in the same way as existing investments. Since new share issues finance only 5% of the capital stock of corporations, changes in the dividend tax have a small impact on the effective taxation of corporate investments.

Our calculations so far are consistent with the "new view" (of Auerbach 1979; Bradford 1981; and King 1977) that dividend taxes do not affect significantly the marginal investment. The competing tradition or "old view" concludes 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 (see McLure 1979). Under this theory, the provisions for a partial deduction of dividend payments would tend significantly to lower the effective tax rate for investments because firms are observed to distribute a sizable fraction of their earnings to shareholders.[16]

It is possible to construct a scenario that is consistent with the findings under the old view, for a payout rate of 50%. Although existing investments are financed 62% by retained earnings, it may not be possible to finance additional new investments entirely from that same source. If corporations have a limited supply of retained earnings and must increase their reliance on new shares to finance marginal investments, then equation (5) may be modified such that equity finance is divided evenly between retained earnings and new shares (c_{re} = .3315 and c_{ns} = .3315, with c_d still equal to .337). Under this alternative, dividend taxes have a substantial impact on the effective tax rate in the corporate sector.

Table 13.6 indicates the investment incentives consistent with the old view of dividend taxation. Under this alternative assumption, there currently exists a 13-point gap between effective tax rates in the corporate and noncorporate sectors. The two administration plans eliminate about one-third of this gap. Under the old view, both new plans would reduce effective tax rates in the corporate sector and thus reduce intersectoral distortions. The reduction in corporate sector capital taxation also means that the overall effective tax rate in the economy would be virtually unchanged from current law. The rate is 38.2% under current law, 37.6% under the Treasury plan, and 36.9% under the president's plan. This slight overall rate reduction may bring about intertemporal welfare gains under the old view of dividends.[17]

Table 13.6 **Investment Incentives with Old View of Dividend Taxes**

	Current Law		Treasury Plan			President's Plan		
	ρ	t	ρ	% change	t	ρ	% change	t
Corporate Sector								
Equipment	.051	.211	.069	(+36.9%)	.423	.062	(+22.1%)	.354
Nonresidential Structures	.082	.512	.077	(−5.6%)	.483	.074	(−10.0%)	.458
Public Utility Structures	.073	.448	.074	(+2.2%)	.460	.066	(−9.7%)	.390
Inventories	.093	.570	.072	(−22.4%)	.445	.076	(−18.0%)	.476
Land	.097	.586	.076	(−21.3%)	.472	.080	(−17.4%)	.500
Total	.077	.480	.072	(−5.6%)	.450	.071	(−7.9%)	.435
Noncorporate Business Sector[a]	.061	.347	.062	(+2.0%)	.359	.061	(−0.3%)	.344
Owner-Occupied Housing[a]	.052	.232	.054	(+3.5%)	.257	.056	(+7.9%)	.288
Average Overall Cost of Capital	.065		.064	(−1.1%)		.063	(−2.0%)	
Standard Deviation	.016		.008			.008		
Average Overall Tax Rate	.382		.376			.369		
Interest Rate[a]	.104		.091			.101		

Note: Numbers in parentheses are percentage changes from current law in the cost of capital (ρ).

[a]The choice between the old and new view of dividend taxes does not affect the noncorporate sector, owner-occupied housing, or the overall interest rates.

13.1.5 Summary of Incentives under Tax Reform

Our analysis has emphasized multiple aspects of proposals for fundamental tax reform. When we adopt the assumption that marginal investments are financed in the same manner as existing investments, then our results are consistent with the new view of dividend taxes. We then show that current law and the president's plan provide the highest incentives for investment as a whole. The costs of capital (and equivalently the effective tax rates on income from capital) are similar under these two regimes. The Treasury plan would raise the cost of capital almost 7% from its current level, and it might therefore deter capital formation. On the other hand, both administration plans would tend to allocate capital more efficiently across its uses. The Treasury plan is most effective in narrowing the disparities in the cost of capital across assets (within each sector), while the president's plan is most effective in narrowing these disparities across industries and sectors (but less across assets). Our overall evaluation of the effects of these proposals on the economy will take into account all these distinctions.

When we adopt the alternative assumption that corporations are more limited in using retained earnings to finance marginal investments and must therefore rely more heavily on new share issues, then neither new plan raises the cost of capital. Under this view, both plans also succeed in reducing disparities across assets and across sectors. Therefore, the resulting welfare gains would be expected to be higher than under the new view.

13.2 A General Equilibrium Model with Allocation of Resources among Assets, Sectors, and Industries

The investment incentives measured in the previous section are used as inputs into the general equilibrium model developed in Fullerton and Henderson (1986). This model is capable of simulating the effects of tax reforms on production by different industries, as well as on aggregate output. Furthermore, because of the detail on capital formation, it can trace the flow of capital simultaneously among different assets and sectors.

13.2.1 A Description of the Model

The consumption side of the model is taken directly from the general equilibrium model of Fullerton, Shoven, and Whalley (FSW 1983), as fully described in Ballard, Fullerton, Shoven, and Whalley (1985). Twelve income-differentiated households have initial endowments of labor and capital that can be sold for use in production. As indicated in the top part of figure 13.1, these households each maximize a nested

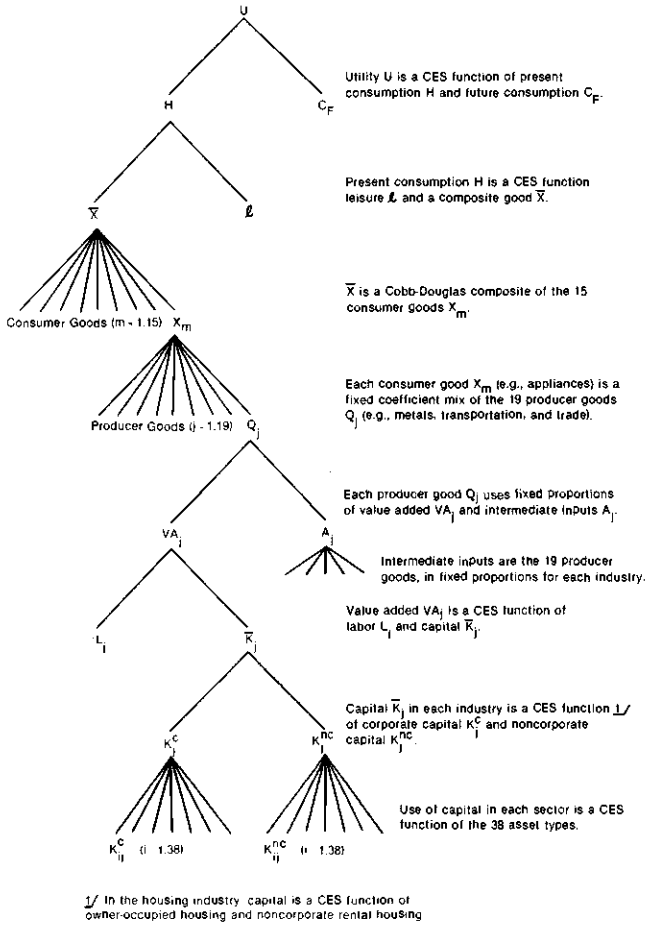

Fig. 13.1 A Diagrammatic Summary of the Model

utility function by making an initial allocation of resources between present consumption and saving. The elasticity of substitution between present and future consumption is based on an exogenously specified aggregate estimate for η, the uncompensated savings elasticity with respect to the net rate of return. We examine alternative savings elasticities.[18]

In evaluating alternative tax reforms, we simulate a sequence of equilibria in which the capital stock increases as a result of saving in the previous period. Domestic saving is the only vehicle by which investment can be affected, since the model is not open to international capital flows. The model is open to balanced trade in commodities, but

there is no scope for saving by foreigners to finance domestic capital formation.

With present resources, as indicated in the next level of figure 13.1, a household can choose to buy some of its own labor endowment for leisure. The elasticity of substitution between consumption and leisure is based on an aggregate estimate of 0.15 for the uncompensated labor supply elasticity with respect to the net-of-tax wage. Present consumption expenditures are then divided among 15 consumer goods according to a Cobb-Douglas subutility nest. Each consumer good is a fixed-coefficient combination of outputs of the 18 industries. The model includes the entire spectrum of federal, state, and local taxes. These are typically modeled as *ad valorem* tax rates on purchases of appropriate products or factors.[19]

Our amendments to this model come in the specification of production decisions. We provide a generalized equilibrium model with endogenous allocation of capital across industries, sectors, and assets.

The structure of production is displayed in the bottom half of figure 13.1, where each industry determines its use of factors in a sequence of stages. The first two stages are similar to the FSW model. First, producers have fixed requirements of intermediate inputs and value added per unit of output. Second, they can substitute between labor and capital in a constant elasticity of substitution (CES) value-added function. The elasticity of substitution between labor and capital in each industry is chosen from an average of econometric estimates in the literature. These average elasticity estimates vary from 0.7 to 1.0 across our 18 private industries. In this stage, however, we depart from the FSW model which constructs capital costs from observed tax payments. Instead, we specify that a Hall-Jorgenson (1967) type cost-of-capital formula determines the demand for capital in each of the 18 private industries, emphasizing investment incentives at the margin. We also add two new stages of production decisions, as described in detail in Fullerton and Henderson (1986). In the third production stage of figure 13.1 for each industry, separate cost-of-capital expressions are used to determine the division among the corporate, noncorporate business, and owner-occupied housing sectors. Fourth, within each sector of each industry, individual cost of capital calculations are used to determine demand for up to 38 different asset types. These assets include 20 types of equipment, 15 types of structures, inventories, and land in each sector.

As described in section 13.1.1, the user costs for individual asset types are built up from information on statutory tax rates, credit rates, tax lifetimes, and other statutory specifications. These costs also depend endogenously on the real after-tax rate of return *(s)* determined

in equilibrium. A composite of those costs applies to each sector of a given industry, and an additional composite of the corporate sector and the noncorporate sector applies to the overall cost of capital for that industry. Each industry has a different mix of assets in each sector, as well as a different mix of sectors, all determined endogenously. When the total use of capital equals the total available supply, we have equilibrium in the capital market; when other markets clear as well, we have a general equilibrium.

Our model is not limited to a unitary elasticity of substitution among assets, as implied by the Cobb-Douglas functional form common in previous studies. Instead, capital in the corporate sector or in the noncorporate sector of each industry is a different CES composite of the 38 assets. The elasticity of substitution among assets (ϵ) may be specified exogenously. Capital in each industry is another CES function of composite capital stocks from each sector of that industry. The elasticity of substitution between corporate and noncorporate capital (σ) is also prespecified.

These generalizations are important because the choices of ϵ and σ, as well as of η, have much bearing on the relative size of different distortions and therefore on the relative attractiveness of alternative reforms. If ϵ is high, for example, then changes in the relative tax treatment of different assets would result in a more significant change in the firm's production technology. A high value for ϵ would therefore imply relatively high welfare gains if a reform tends to equalize the tax treatment of different assets. If σ is high, then the sectoral allocation of capital would be quite sensitive to changes in the relative tax treatment of corporations, noncorporate business, and owner-occupied housing. High values of σ would be reflected in high welfare gains from equalizing rates among sectors. Finally, the choice of η, the savings elasticity, matters for aggregate capital accumulation. If η is high, then reduced taxation of the return to income from capital would result in a higher saving response than in the case where η is low. As this assumed elasticity rises, any tax wedge between the gross and net return to saving results in a greater measured efficiency loss. The gain from reducing the overall tax on capital would therefore be larger as η increases.

13.2.2 Simulation and Sensitivity

Before presenting the results themselves, it is necessary to describe our simulations. We simulate a sequence of 6 equilibria that are 10 years apart, so our total simulation interval is 50 years. All our simulations assume an adjustment to lump-sum taxes (positive or negative

as appropriate) in order to restore the revenue yield of the baseline. We perform the simulations for each view of dividend taxes under a "standard" set of parameters, and also under several alternatives.

The standard set of parameters include $\epsilon = 1$ and $\sigma = 1$, the Cobb-Douglas case for assets and sectors, plus $\eta = 0.4$, which is consistent with the estimate of Boskin (1978). Our strategy in constructing alternatives is not to show all plausible combinations of ϵ, σ, and η. Instead, we pick combinations that point out the likely range of welfare effects from tax reform. Thus, for each view of dividend taxes, we simulate the effects of one set of parameters that is likely to produce relatively "favorable" effects and one that is likely to produce relatively "unfavorable" effects. As discussed below, these sets of parameters necessarily differ between the new view and old view cases.

We consider values of ϵ and σ between 0.5 and 3, and values of η between 0 and 0.4. As we stressed in our earlier literature review (Fullerton and Henderson, 1986), existing econometric work on substitution elasticities does not consider the number of assets we include in this model. Neither does it attempt specifically to measure a sectoral substitution elasticity. There remains considerable uncertainty about these parameter values. For the savings elasticity, our lower bound of zero is in accord with the estimate of Howrey and Hymans (1978).

Under the case with existing financing shares—or new view—both of the reforms reduce interasset distortions. In addition, the Treasury plan increases intersectoral and intemporal distortions, while the president's plan is approximately neutral in these respects. The welfare gains might therefore be sensitive to the relative importance of these interasset, intersectoral, and intertemporal factors. The two administration proposals could be expected to produce the highest welfare gains in the case where ϵ is high. Low values of σ and η would be expected to raise estimated gains (or reduce losses) from the Treasury plan, but to have minor impact in the evaluation of the president's plan. Therefore a favorable set of parameters for the new view is: $\epsilon = 3$, $\sigma = 0.5$, and $\eta = 0$; and an unfavorable set of parameters for the new view is: $\epsilon = 0.5$, $\sigma = 3$, and $\eta = 0.4$.

We perform a second set of simulations using financing proportions that give results consistent with the old view of dividend taxes. Table 13.6 indicates that, under the old view, both administration plans would lower the differential taxation of assets and of sectors. Thus, these plans would yield higher welfare gains the higher are ϵ and σ. Because they would also slightly lower the overall cost of capital, welfare gains would rise somewhat with η. To analyze the sensitivity of these results, we examine the old view under two alternatives to the standard parameters. The favorable case for the old view is: $\epsilon = 3, \sigma = 3, \eta = .4$;

the relatively unfavorable case for the old view is $\epsilon = .5$, $\sigma = .5$, $\eta = 0$.

13.2.3 Interpretation of Simulations

Simulation analysis such as we perform here can provide highly detailed results. It is always necessary to bear in mind, however, the limitations of such studies. We would like to mention three types of issues: the quantification of tax reform measures; the specification of economic behavior; and the usefulness of our results for policy decisions.

First, although our simulations take into account major elements of the tax reform proposals as they pertain to capital formation, they do not take into account all aspects of fundamental tax reform. For example, both plans introduce substantial proposals for indexing. We capture the effect of indexation on investment incentives at our given inflation rate of 4%, but not on reducing the uncertainties caused by varying inflation. To take another important example, the plans reduce personal marginal income tax rates in ways that might increase participation in the labor force and decrease activity in the underground economy.[20] We do not measure welfare effects from these changes. As well, the proposals introduce new features that could have sizable influences on particular industries. Examples include the changes for energy subsidies and for accounting in the case of multiperiod production. We do not include such policy changes in our measures of capital costs.[21]

Second, any simulation model necessarily simplifies some aspects of economic decisionmaking. One example relevant to our model is the specification of financial choices. The reform plans raise the cost of debt finance for corporations, yet we do not alter firms' debt-equity ratios to reflect this change. Also, we have made specific choices with respect to capital allocation decisions. Our use of the ϵ parameter implies that firms view all assets as substitutes for one another in production; we omit the possibility that some assets are complements. Our use of the σ parameter attempts to capture the impact of capital costs on incorporation decisions, but we do not explicitly model the effect on these decisions of providing limited liability or access to national financial markets.

Finally, it should be emphasized that we do not consider the effects of fundamental tax reform on "fairness" or "simplicity," concepts that are important in both the Treasury's and the president's reports. Any changes in the achievement of these goals would be additional criteria by which to assess tax reform.

In summary, the various results found in section 13.3 must necessarily be interpreted with caution. Any overall evaluation of tax reform should use appropriate additional information and judgment.

13.3 General Equilibrium Results

13.3.1 Welfare, Output, and Capital Formation

Table 13.7 presents the welfare gains or losses as well as the effects on capital formation. First, panel I reflects the new view. As shown there, the tax reform proposals generally cause an increase in economic welfare even if they bring about a decrease in the capital stock. The welfare-reducing effects of the slight 1.7% increase in the cost of capital under the president's plan and even the 6.8% increase under the Treasury plan are generally offset by the welfare-augmenting effect of a better allocation of capital across its uses. It is therefore possible to achieve larger output from a given capital stock, and in fact—as the simulations indicate—to achieve larger output from a slightly smaller capital stock.[22]

In comparing the two reform proposals generally, we find that the president's plan has larger welfare gains and a smaller drop in the capital stock. These results follow from the findings in table 13.5 that the president's plan would achieve greater reduction in the standard deviation of the capital costs and almost no increase in the cost of capital.

Turning specifically to the Treasury plan, efficiency effects are relatively small for any set of parameters. Under the favorable case of a high asset substitution parameter, a low sector substitution parameter, and a low savings elasticity, the present discounted value of welfare gains is $678 billion (1984 dollars). This figure represents an increase of 0.6% over the present value of income and leisure in the baseline. Under the unfavorable set of parameters, there is a welfare loss of $112 billion, or 0.1%. The standard-case parameters yield a slight increase in welfare. The range of estimates for the change in the capital stock is -0.5 to -1.9%.

For the president's plan, the indicated welfare changes are all positive, ranging from $292 billion to $861 billion (or 0.2% to 0.7%). Under the favorable set of parameters, there is no change in the capital stock, indicating that the "price effect" of a slightly raised overall cost of capital is offset by the "income effect" of savings out of the greater output generated by more efficient resource allocation. The other parameter combinations show a 0.2 to 0.3% decline in the capital stock.

We turn next to the old view of dividends, the case where marginal equity investments are half subject to dividend taxation, and half to capital gains treatment. The results in panel II indicate welfare gains that are considerably higher than those in panel I, and changes in the capital stock that are all positive. Under the old view, the proposals reduce interasset distortions, intersectoral distortions, and intertemporal distortions. They therefore produce efficiency gains even in the least favorable case where all relevant elasticities are small ($\epsilon = .5$, $\sigma = .5$, $\eta = 0$).

Table 13.7 **Welfare Gains and Capital Formation from Fundamental Tax Reform**

	Welfare Gains[a] (billions of 1984 dollars)				Long-Run Change in Capital Stock[b]	
	Treasury Plan		President's Plan		Treasury Plan	President's Plan
I. New View of Dividend Taxes						
A. Standard case: $\epsilon = 1, \sigma = 1, \eta = .4$	58.8	(0.1)	367.8	(0.3)	−1.9	−0.2
B. Favorable case: $\epsilon = 3, \sigma = .5, \eta = 0$	678.2	(0.6)	861.3	(0.7)	−0.5	0.0
C. Unfavorable case: $\epsilon = .5, \sigma = 3, \eta = .4$	−112.1	(−0.1)	291.7	(0.2)	−1.9	−0.3
II. Old View of Dividend Taxes						
A. Standard case: $\epsilon = 1, \sigma = 1, \eta = .4$	606.4	(0.5)	692.0	(0.6)	+1.0	+1.3
B. Favorable case: $\epsilon = 3, \sigma = 3, \eta = .4$	1408.0	(1.2)	1419.0	(1.2)	+1.0	+1.0
C. Unfavorable case: $\epsilon = .5, \sigma = .5, \eta = 0$	329.2	(0.3)	423.6	(0.4)	+0.5	+0.7

[a]Welfare gains are measured as the present discounted value of equivalent variations. The numbers in parentheses express the gains or losses as a percentage of the present discounted value of welfare (consumption plus leisure) in the baseline sequence.

[b]Percent difference from baseline capital stock after fifty years.

Furthermore, the findings for the Treasury and president's plans are similar, as might be anticipated from their similar effects on both the level and the standard deviation of capital costs in table 13.6. For the Treasury plan, the cases shown yield welfare gains between 0.3 and 1.2% and increases in the capital stock between 0.5 and 1.0%. For the president's plan, the welfare gains are estimated between 0.4 and 1.2%, and the capital stock rises between 0.7 and 1.3%. This set of simulations produces larger increases in welfare and capital formation because the partial integration introduced by the administration's proposals is found to lower the cost of capital significantly. The contrast between the new and old views is particularly marked in the simulations of the Treasury plan because firms would deduct half of dividend payments, as opposed to only 10% under the president's plan.

13.3.2 Allocation of Capital among Assets and Sectors

Under current law, investment in equipment is tax-favored as a result of the investment tax credit and very short lifetimes for depreciation. At the other extreme, returns to investments in inventories and land face statutory tax rates.

Both proposed plans narrow the differences in these tax treatments. As a result, firms would alter their relative demands for these assets. Table 13.8 illustrates this reallocation for the corporate sector, for the standard parameters under the new view (where ϵ, the asset substitution elasticity, equals 1). Similar reallocations would take place in the noncorporate business sector.[23] Under our 1984 baseline data, 29.5% of the corporate capital stock is in the form of equipment. This share would drop to 19.7% under the Treasury plan and 21.8% under the president's plan. Inventories currently account for 34.2% of corporate capital stock, but are estimated to account for 41.8% under the Treasury proposal and 39.0% under the president's plan. The use of land in the corporate sector would also increase. Firms would continue to use

Table 13.8 **Eventual Allocation of Corporate Capital Across Asset Types** (After fifty years, as proportion of total)[a]

	Baseline	Treasury Plan	President's Plan
Equipment	.295	.197	.218
Structures	.149	.155	.160
Public Utility Property	.112	.107	.118
Inventories	.342	.418	.390
Land	.101	.123	.115

[a]Assumes new view of dividends.

about the same share of structures and public utility property, assets that are currently taxed at rates close to the average rate for the corporate sector. In the simulations with a higher value of ϵ (not shown), these reallocations are in the same direction but larger in magnitude. As the asset elasticity parameter increases, corporations change their production processes more sharply in reaction to changes in relative user costs for different assets.

Our simulations also measure the effect of tax reform in redistributing capital among the three sectors of the economy.[24] Under the new view, both proposals would shift capital toward the noncorporate business sector and away from owner-occupied housing. Additionally, in the case of the Treasury plan, the 13% increase in the corporate cost of capital would eventually result in an 8% decrease in the size of capital in the corporate sector (see fig. 13.2). The president's plan would result in essentially no change in the corporate capital stock, given the very slight 0.3% increase in the corporate cost of capital.

The assumption about the effects of dividend taxation is a significant factor in this allocation. When we adopt the conclusion of the old view that the existing taxation of dividends discourages investment, then the administration's proposals would increase capital in the corporate sector. The 50% dividend deduction under the Treasury plan would more than offset the cost-raising effects of less generous depreciation allowances and the removal of the investment tax credit. Relative use of capital would rise in the corporate sector and fall in the noncorporate and housing sectors. These relative flows, together with a 1% increase

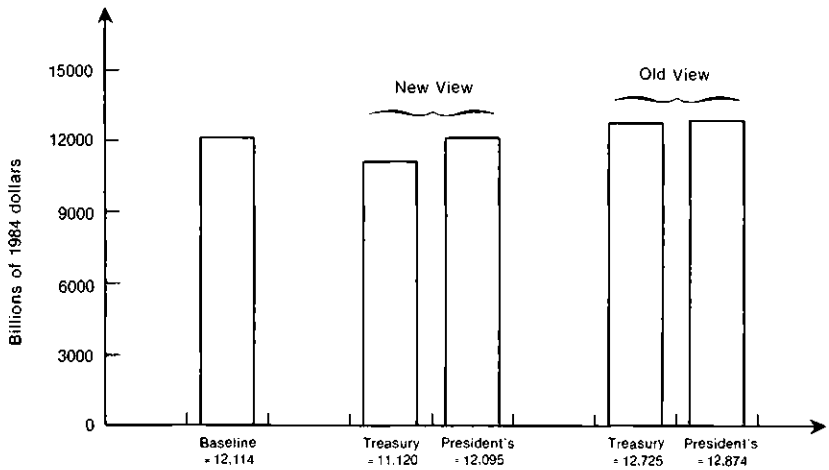

Fig. 13.2 Allocation of Capital in the Corporate Sector after 50 years (standard case parameters)

in total capital, allow the corporate sector capital stock to rise by 5%, as illustrated in figure 13.2. Under the president's plan, the 10% dividend deduction in combination with more generous cost recovery provisions than in the Treasury plan would also yield a 1% increase in total capital, but a 6% increase in corporate capital, and a commensurate decline of 5% in the stock of owner-occupied housing.

13.3.3 Results for Industries

As just indicated, either reform would expand the productive use of land and inventories at the expense of equipment. Also, under our standard parameters ($\epsilon = 1$, $\sigma = 1$, $\eta = 0.4$), and new view of dividends, the noncorporate business sector would grow while the corporate and owner-occupied housing sectors would contract. Since our industry costs of capital are derived from asset- and sector-specific costs of capital, the factors that affect asset and sectoral allocations will also affect industry allocations. In a general equilibrium model such as this one, simulations also indicate changes in demand for the outputs of different industries. This change in the output mix generates changes in the patterns of demand for labor and capital.

Table 13.9 presents the eventual changes in the output and use of capital for 9 private industries.[25] Under the Treasury proposal with the new view, the only industries that experience an increase in output in the long run are agriculture and housing. These industries' capital stocks also increase, as might be expected given their largely noncorporate status and their heavy reliance on land. The capital stock is also projected to rise in the trade industry (because of the high use of inventories) and finance and insurance (because of the low use of equipment).

The industrial pattern under the president's plan is similar, except for the projected decline in real estate.[26] Also, more industries would experience increases in output and capital usage.

Once again the theory of dividend taxation matters for the results, since it affects the attractiveness of doing business under the corporate form. When we adopt the old view (not shown), capital in the real estate industry would decline and capital in the heavily corporate manufacturing industries would increase, under both plans. There would also be large increases in both output and use of capital in the construction and trade industries.

13.4 Conclusions

Recent proposals for fundamental tax reform differ in their relative emphasis on interasset, intersectoral, interindustry, and intertemporal distortions. The model in this paper addresses these multiple issues in the design of taxes on capital incomes. It is capable of measuring the

Table 13.9 **Eventual Output and Capital Stock by Industry[a]**

Industry	Baseline after Fifty Years (billions of 1984 dollars)		Treasury Plan[b]		President's Plan[b]	
	Output	Capital Stock	% Output	% Capital Stock	% Output	% Capital Stock
1 Agriculture	786.7	6,186.0	+7.4	+7.4	+4.2	+4.0
2 Mining	196.8	1,110.0	−5.8	−12.0	−1.3	−3.7
3 Construction	630.2	699.8	−1.5	−4.1	−0.5	−0.5
4 Manufacturing	4,936.4	4,616.8	−0.2	−5.9	+0.8	+0.1
5 Utilities	1,067.5	3,272.8	−4.8	−19.8	−1.4	−7.5
6 Trade	1,621.9	4,389.5	−0.1	+2.6	+0.9	+5.5
7 Finance and Insurance	588.0	565.7	−0.3	+1.5	+0.3	+4.4
8 Real Estate	1,109.5	10,777.9	+0.2	+0.1	−1.4	−2.1
9 Services	1,685.2	877.2	−0.6	−14.8	−0.0	−8.4
Total	12,622.1	32,495.4	−0.3	−1.9	+0.4	−0.2

[a]Assumes new view of dividends.

[b]Percentage changes from the baseline, after fifty years, in the private sector only.

net effects of changes in statutory rates, credits, depreciation allowances, and other features such as the indexation of interest and capital gains. It can compare costs of capital for individual assets, sectors, and industries, and it weighs these together to evaluate the impact on total investment incentives. In a fully general equilibrium system, it can simulate alternative resource allocations and associated changes in welfare. For the overall evaluation of alternative tax reform proposals, the simultaneous consideration of these multiple effects is crucial.

The model is used to compare current law, the Treasury Department tax reform plan of November 1984, and the president's proposal of May 1985. Under the new view that dividend taxes have a small effect on investment incentives, both reforms would reduce interasset distortions and the president's plan would reduce intersectoral distortions, but the Treasury plan would exacerbate intertemporal distortions. Still, for most parameters, both reforms generate net welfare gains even with slight declines in the capital stock. Under the old view that dividend taxes have a significant effect on investment incentives, both plans reduce corporate taxation through their partial deductions for dividends paid. They thus reduce intersectoral distortions as well as differences among assets. Under this view, the Treasury plan no longer increases intertemporal distortions. Even for the least favorable set of parameters in this case, these reforms raise both the capital stock and the real value of output above their baseline values. Finally, the paper shows alternative allocations of capital among assets, sectors, and industries.

Notes

1. We do not evaluate the House bill here. Charles McLure (1986) provides excellent description and analysis of the revisions in the proposals between fall 1984 and spring 1985.

2. This paper does not consider the effects of these rate cuts on labor income and labor supply. We concentrate exclusively on their effects on capital.

3. The effects of uncertainty and imperfect loss offsets are investigated in Auerbach (1983) and Auerbach and Poterba (1987).

4. 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. Similarly, firms pay unnecessary taxes by using FIFO inventory accounting, but calculations here assume LIFO methods. The effect of FIFO inventory accounting is shown in Henderson (1985).

5. The fraction f is 1.0 under current U.S. law.

6. The parameter θ is the opportunity cost of retentions in terms of forgone dividends (gross of personal taxes). It is 1.0 under current law.

7. One obvious result of our arbitrage assumption is that if individuals earn the same rate of return net of all taxes from debt and equity, then the firm

must earn a higher marginal product on a project financed by equity than on the same project financed by debt. In a context of perfect certainty, this can be justified only if for some reason firms must use a given mix of finance. Here, we do not model the role of uncertainty or institutional restrictions that cause observed financing choices. We take these choices to be exogenous. An alternative assumption might be that firms, rather than individuals, arbitrage between debt and equity. The effects of firm arbitrage on measured tax rates are explored in Fullerton and Henderson (1984), Henderson (1985), and Fullerton (1985). This alternative view would be supported in the perfect certainty framework only if individuals in different income groups specialize in different assets, as in Miller (1977).

8. See Lindsey and Navratil (1985) for further description of this model.

9. See p. 221 of King and Fullerton (1984).

10. See King and Fullerton (1984, pp. 221–22).

11. A subsidy, or negative effective tax rate, means that tax credits and depreciation allowances are so generous that they outweigh the effects of taxes on net income and property values. Under a subsidy, the value of ρ required to earn $s = .04$ after tax is lower than 4%.

12. From the July 1985 *Survey of Current Business*, we obtain 1981 data for corporate equipment, corporate structures, noncorporate equipment, and noncorporate structures. We also obtain data for total depreciable capital stocks by 18 industries. We project each of these 22 capital stock figures to 1984 by using an econometric estimate of the relationship between economic growth and capital formation. We then use an RAS procedure with these 1984 targets to adjust an unpublished 1977 matrix from Dale Jorgenson, showing each of these four types of assets used in each of the 18 industries. Finally, we obtain the finer capital allocations for all 20 types of equipment and 15 types of structures, by using disaggregate proportions in the Jorgenson data. These data also form the basis for our 1984 projections for the values of land and inventories in each of our industries.

13. An important caveat to these statements is that we have assumed identical financing shares for all assets, industries, and sectors.

14. To see this argument, consider a firm that wishes to invest in \$1 more of capital by retaining an additional dollar of earnings. To retain an extra dollar, the firm must necessarily reduce dividend payments. As shown in section 13.1.2, the dividends foregone equal $1/(1 - gu)$ gross of personal tax, or $(1 - \tau_{ns})/(1 - gu)$ net of personal tax. (Recall that u is the statutory corporate rate, g the fraction of dividends deductible from corporate income, and τ_{ns} the personal tax rate on dividend income.) In the following period the asset earns a pretax return of r, and the resulting income available for dividend payout is $r(1 - u)/(1 - gu)$, or $(1 - \tau_{ns})r(1 - u)/(1 - gu)$ net of personal tax. The return to shareholders relative to dividends foregone in the first period is thus $r(1 - u)$. This return is independent of the parameters τ_{ns} and g, since these affect identically the numerator and denominator in the calculation of the rate of return.

15. The parameter g enters because $\theta = 1/(1 - gu)$.

16. The new view received empirical support in a study by Auerbach (1984), but the old view was found more compatible with historical evidence in Poterba and Summers (1983, 1985). Poterba and Summers (1985) also explain some conceptual problems associated with each theory.

17. Another finding is that the Treasury plan is neutral with respect to firms' choices between retaining earnings and issuing new shares. That is, the costs of capital in the corporate sector do not differ between Tables 13.5 and 13.6. Although the Treasury plan maintains personal tax rates that are lower for

capital gains than for dividends, the 50% dividend deduction at the corporate level completely offsets this rate differential. We do not attempt to measure potential efficiency gains from any reduced distortions in financial decisions.

18. Our model assumes that households form expectations of the rate of return myopically. Ballard and Goulder (1985) examine the effect of incorporating perfect foresight expectations into the Fullerton-Shoven-Whalley model.

19. The model also requires that government run a balanced budget. Therefore, when our simulations raise (lower) national output and income, we must offset the resulting revenue gains (losses) by cutting (increasing) some other tax. We do this by changing income taxes in a lump-sum manner.

20. These effects are analyzed by Slemrod (1986).

21. The construction of a measure for the cost of capital requires assessments about the degree to which various aspects of taxation affect investment at the margin. Some corporate tax features may affect employment, profits, or other behavior, without affecting investment at the margin. The windfall recapture tax of the president's proposal, for example, would acquire revenue from corporations that received accelerated depreciation on their existing holdings of assets and that would earn income subject to the new lower rate. Other provisions in the proposals would affect the timing of revenue more than they affect the present value of tax on marginal investment. Indeed, it is because tax revenue is often a poor guide to investment incentives that we turn to the concept of the cost of capital. Yet, because the cost of capital cannot account for every feature of the tax code, it may omit important effects on incentives.

22. Although our measure of welfare gain includes changes in the value of leisure time, the simulations affect leisure only slightly. Therefore, output and welfare move in the same direction.

23. The results under standard parameters for the old view are similar. The choice between the old view and the new view primarily affects the relative costs of investment across sectors, not across assets within a sector.

24. Figure 2 again considers the standard parameters, with $\epsilon = 1$, $\sigma = 1$, and $\eta = 0.4$.

25. In Table 13.9, industry 2 combines the two extractive industries in our model, while the manufacturing category combines 9 more detailed industries: food and tobacco; textiles, apparel, and leather; paper and printing; petroleum refining; chemicals and rubber; lumber, furniture, stone, clay, and glass; metals and machinery; transportation equipment; and motor vehicles.

26. The proposals appear to treat owner-occupied housing identically, since both would terminate the deduction for local property taxes and both maintain full deductibility of mortgage interest payments. However, the Treasury proposal indexes interest deductions of businesses and thus reduces the nominal interest rate (see Table 13.5). The Treasury plan therefore lowers the relative cost of housing capital more than does the president's proposal (which has no interest indexing).

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Comment J. Gregory Ballentine

The Fullerton/Henderson analysis embodies important extensions of previous large scale general equilibrium modeling of tax changes. As such, the analysis is highly valuable. The extensions, however, are far too preliminary and the modeling of tax changes is too limited to provide reliable answers to the questions the paper poses concerning the effect of the Treasury reform proposals on economic efficiency. In particular, the limitations in the modeling of tax changes cause an understatement of the rise in the cost of capital induced by the Treasury proposal that may make the results misleading. This limitation is not unique to the Fullerton/Henderson analysis; it is quite common.

Three specific limitations of the Fullerton/Henderson analysis are presented below. The first, and the one that will be discussed at greatest length, is the incomplete modeling of tax changes. The second is the measurement of certain tax parameters, and the third is the empirical foundation for the modeling of the choice between corporate and noncorporate form.

The Modeling of Tax Law Changes

The Fullerton/Henderson analysis purportedly examines the effect of the two tax reform proposals, Treasury I and II (referred to above as the Treasury plan and the President's plan, respectively), on the

J. Gregory Ballentine is Principal and National Director of Tax Analysis at Peat, Marwick, Mitchell and Co. in Washington, D.C.

interindustry, intersectoral, and intertemporal allocation of capital. Accordingly, the primary focus of the paper is on the effects of the capital income tax changes. The analysis, however, only takes into account some of the tax changes in the Treasury proposals. Specifically, the elimination of the ITC, the new depreciation schedules, indexing, the new tax rates, and the dividend deduction are included; other provisions are omitted.

The table below shows the revenue effect for 1985 and 1990 of the corporate income tax provisions included in the paper compared with the omitted corporate provisions. (The windfall recapture provision and a few other clearly inframarginal provisions are excluded from the table. Indexed FIFO is also excluded since the paper assumes LIFO is used.)

	Treasury I ($ billions)		Treasury II ($ billions)	
	1989	1990	1989	1990
Included Provisions				
Rate Reductions	−51.1	−58.4	−39.7	−42.5
Depreciation	51.8	68.0	8.7	15.4
ITC	29.2	31.7	33.3	37.4
Dividend Deduction	−29.0	−38.2	−7.2	−8.0
Other	−5.2	−4.4	—	—
Subtotal Included	−4.3	−1.3	−4.9	2.3
Excluded Provisions	40.5	43.9	24.3	27.3

This table only includes corporate tax provisions. Also omitted from the paper are various pension changes that, on balance, raise revenues and, presumably, raise the cost of capital. The main point to recognize is that these numbers strongly *suggest* that the Fullerton/Henderson analysis understates the increase in the cost of capital and may, therefore, give a much more favorable impression of the effects of the two reform proposals than is warranted.

The revenue estimates do not prove this conclusion, but only suggest it for at least two reasons. First, revenue estimates include some purely inframarginal effects and, second, they represent some proposals that may improve the interasset allocation of resources.

Broadly speaking, the omitted corporate provisions fall into three categories: those directly affecting certain assets, those affecting financial intermediation, and those affecting international investments. Included in the first category are the changes in multiperiod accounting rules. Consider, for example, work in process inventory investment. Under current law a portion of the cost of such investment is expensed.

That portion includes certain labor costs (mostly pension costs) as well as some interest and capital costs.

Treasury I and II reduce, and perhaps eliminate, the amount that can be expensed. The same changes are proposed for self-constructed assets; under current law part of that investment is expensed and part depreciated using ACRS. Treasury I and II reduce or eliminate that expensing.

With adequate data on inventory investment and investment in self-constructed assets, incorporating the multiperiod accounting changes in the Fullerton/Henderson analysis should be straightforward. That is, fractional expensing fits easily into the Jorgenson cost-of-capital framework that Fullerton/Henderson use. This change alone would be useful. In Treasury II these multiperiod accounting provisions raise $8.3 billion in corporate taxes in 1990. While the revenue estimate overstates the significance of these provisions, since it includes a kind of recapture of past expensing benefits for inventories, an analysis of the impact of the Treasury proposals should not ignore this or similar provisions. (Other omitted provisions that are fairly asset-specific include oil tax changes, mining tax changes, changes for pollution control assets, etc.)

The second category of tax changes deals with financial intermediation. Most of these increase taxes currently paid by banks and insurance companies. Some, including the non-bank bad debt proposal, however, affect other firms in their capacity as lenders that hold accounts receivable. The changes in this area do not fit easily into a Jorgenson cost-of-capital framework. Incorporating them requires modeling the tax treatment of financial intermediaries and its effect on the cost of capital. This is a rather forbidding task and it is unfair to expect Fullerton and Henderson to provide such a new model in an otherwise substantial project. Since, however, virtually all of the financial intermediary changes raise corporate revenues, it is almost certain that they raise the cost of capital. (These financial intermediary changes raise more than $8.8 billion in 1990 under Treasury II.) Thus, due to this omission alone, the Fullerton/Henderson results should be identified as a clear understatement of the increase in the cost of capital caused by the reform proposals.

The last general category of omitted corporate tax increases includes the international tax changes. These involve requiring a per-country foreign tax credit limit instead of a worldwide limit, changing the rules determining whether income is foreign source or U.S. source, and other changes. (In Treasury II the foreign provisions raise corporate taxes by $5.1 billion in 1990.) Incorporating these changes is, presumably, quite difficult since it requires including foreign investment in the model as well as modeling the complex tax changes. As in the case with the

financial intermediary changes, all that can be expected of the Fullerton/Henderson analysis is an acknowledgement of the omission and a discussion of the likely bias caused by that omission.

Overall, the omissions make the results of the Fullerton/Henderson study very unreliable. Essentially, Fullerton and Henderson examine two hypothetical tax proposals that appear to involve a net reduction in corporation income taxes. They do not really examine Treasury I and Treasury II; those proposals, particularly Treasury I, involve a significant increase in corporate taxes. Of course, simply looking at the projected revenue changes is not an adequate alternative. Nonetheless, it is disconcerting to have results presented purportedly describing the economic effects of tax reform bills that involve large corporate tax increases balanced by personal tax reductions, whereas, in fact, the results are based on an analysis of corporate tax reductions.

It should be recognized that this problem is not limited to the Fullerton/Henderson analysis. There have been numerous economic studies of the effect of tax reform on the cost of capital, effective tax rates, and the allocation of capital. The Treasury, for example, has confidently asserted that Treasury II lowers the cost of capital. Economists have testified before Congress presenting estimates of the effect various reform proposals have on the cost of capital. Yet all of these studies have the same or more omissions as Fullerton/Henderson. It is unfortunate that economists have spoken with such confidence on the effect of reform proposals that raise corporate taxes 25% to 40% based on conclusions derived from modeling the effects of a corporate tax reduction.

Tax Parameters

The effective tax rates used in the Fullerton/Henderson analysis are the excess of the pre-tax return over the after-tax return divided by the pre-tax return. Using their notation, the rates are given by:

$$\frac{\rho - S}{\rho}$$

With some manipulation, and ignoring property taxes and new share finance, the effective tax rate for the corporate sector is:

$$\frac{\rho - S}{\rho} = \frac{\rho - (r - \pi)}{\rho} + \frac{S + \pi}{\rho}\left(C_d \frac{(1 - u)}{(1 - t_d)} + \frac{C_e}{(1 - t_{re})} - 1\right).$$

The first term is the effective tax rate at the company level; it depends largely on the investment tax credit, z (the present value of depreciation

deductions), and u the corporate tax rate. The second term captures the effects of financial policy and the difference between the corporate tax rate and the tax rate on debt and retained earnings. For many cases, the second term is as important, or more important, than the first in determining the overall tax rate.

An accurate calculation of present law effective tax rates requires accurate values for u, t_d (the tax rate on debt) and t_{re} (the personal tax rate on retained earnings). Comparable tax rates for noncorporate investments require an accurate value for t_{nc}, the personal tax rate on noncorporate investors.

The corporate tax rate, u, is taken to be .46. This would be accurate if, at the margin, all corporations were taxable. However, the computations in the paper indicate large negative effective corporate tax rates. This lends to an apparent contradiction; if corporate rates are generally negative and fairly large in absolute value, then u should be less than .46. If, however, u is less than .46, the effective tax rates are not so negative. The authors should conduct some experiments on hypothetical firms whose growth tracks the overall growth of the modeled economy to see if those firms have a positive tax base, so that u is .46. If they do not have a positive tax base, either u should be lowered or the model should be adjusted to reflect higher taxes.

The issues surrounding the values of t_d and t_{nc} are different. Conceptually, t_d reflects the tax rate on the marginal investors in taxable bonds. It is those marginal investors who determine the taxable interest rate. Similarly, t_{nc} is the tax rate on the marginal investor in noncorporate equity. Calculation of t_d and t_{nc} requires modeling individual portfolio choice assuming progressive tax rates. The Fullerton/Henderson paper does not do this. Instead, in it t_d and t_{nc} are computed as the weighted average tax rate of all those who earn interest or noncorporate profits. This may be consistent with a model of portfolio choice, but no such model is presented or referenced. Instead, the paper asserts that the "marginal investment under consideration is an equiproportionate increase in all capital stocks" (sec. 13.1.2) and from this concludes that additional "debt and interest income, for example, would be distributed among debt holders in proportion to their current debt and interest income" and that the "appropriate marginal tax rate is thus the average of all debt holders' marginal rates, weighted by their interest income."

This reasoning is incorrect. The margin in question does not depend upon some hypothetical proportionate expansion of the capital stock. The margin exists even in a static setting and involves marginal portfolio allocations by individuals. It may be that the computed tax rates are correct, if it is assumed that each individual's portfolio distribution is fixed independent of relative returns or changes in statutory marginal

tax rates. This, however, is not so much a model of marginal portfolio choice as it is an *ad hoc* assumption.

To investigate the sensitivity of results to other values of t_d and t_{nc}, Fullerton and Henderson should consider alternatives. For example, they might follow Hendershott's approach in a paper in this volume and infer t_d from the implicit tax on tax exempt bonds. This gives a value of t_d of about .3, higher than that used by Fullerton and Henderson.

The Corporate/Noncorporate Distortion

The authors model most industries as including both corporate and noncorporate firms. The authors do not, however, provide any detailed analysis of the determination of the distribution of corporate and noncorporate firms within any industry. In effect they assume that, absent differences in tax rates on the two business forms, the distribution would be optimal. Tax rate differences cause the distribution to shift, leading to efficiency losses. (They term these losses intersectoral efficiency losses.) The extent of the shift is measured by assuming an elasticity of substitution between the different business forms.

As a conceptual matter, this model of the choice of business form is quite rudimentary. As an empirical tool for estimating the efficiency effect of a realistic tax reform proposal, it is without any grounds. Fullerton and Henderson cannot be criticized for not providing a more substantial empirical basis for their intersectoral efficiency estimates; to do so is a separate and very ambitious research project. The criticism is based on their portrayal of their empirical results as something more than an illustration of their modeling techniques.

In recognition of the lack of empirical evidence on the determinants of business form, Fullerton and Henderson use a range of values for their elasticity from $-.5$ to 3. When there are different empirical estimates of an elasticity, but the values cover some reasonable range, such sensitivity analysis is often an effective way of dealing with the absence of a fairly precise, agreed upon estimate. In this case, however, there is no real basis for the range used in the sensitivity analysis, nor is there evidence suggesting that any constant elasticity form is appropriate. The sensitivity analysis, if pursued more than is reported in the paper, might show how important changes in business form can be, but unless they are shown to be unimportant over a very wide range of possibilities, the specific results presented by Fullerton and Henderson should not be relied upon in judging realistic tax proposals.

Summary

Overall the Fullerton/Henderson analysis is a significant improvement in the modeling of tax changes. The specific results, however, should not be relied upon for evaluating current reform proposals. They

are based on a caricature of the reform proposals. That caricature may be useful, but that is quite unclear and should be investigated, not assumed to be true. Further, crucial tax parameters need to be based on models of portfolio behavior and made consistent with loss limitations under our tax laws. Finally, the distortion in the choice of business form is an interesting issue to include in large scale general equilibrium models, but there is no empirical basis for evaluating its importance.