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INCOME TAX INCENTIVES TO PROMOTE SAVING

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ABSTRACT

This paper examines six possible reforms of the U.S. personal income tax system. The paper evaluates the proposals by estimating the dynamic analog to compensating variations using a medium-scale general equilibrium model designed to allow a broad range of tax policies. We find that proposals to index the tax system for inflation tend to provide large welfare gains, while other measures designed to raise the net-of-tax return to capital are successful to the extent that they serve as *ad hoc* offsets for inflation or to the extent that they partially integrate the corporate and personal income taxes. Results also indicate that intertemporal and interindustry efficiency gains are of comparable importance. Finally, results suggest that additional intertemporal welfare gains can be achieved at the cost of a more regressive over-all tax structure.

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Economic research as well as popular attention has focused in recent years on the intertemporal and interindustry efficiency distortions in the U. S. tax system. This paper estimates the welfare gains from proposals intended to reduce distortions imposed by the present tax structure, and notes the degree to which these gains derive from intertemporal or interindustry corrections. Our model and results support three propositions. First, the proper allocation of new capital is as crucial as the creation of new capital itself. Second, tax reform plans to index the system against inflation are more potent in this combined task of increasing savings and allocating investment efficiently than are ad hoc measures designed to encourage saving, such as interest income exclusions, capital gains exclusions or pension liberalization. Finally, larger welfare gains from removal of intertemporal and interindustry distortions entail the cost of a less progressive tax structure, since high income groups tend to save a higher proportion of their income.

We examine six alternative plans which might be discussed in an effort to increase consumer savings through the personal income tax system in the United States. These plans attempt to affect savings through an increase in the real rate of return either by direct tax cuts on savings or by indexing tax rates against inflation. The paper presents estimates of static and dynamic resource allocation effects for the six plans, and compares them to results obtained in earlier work on the impacts of more sweeping reforms. A medium-scale numerical general equilibrium model is used which integrates the U. S. tax system with consumer demand behavior by household and producer behavior by industry.

The static or annual welfare measures are derived by comparing the 1973 base year to a single counterfactual equilibrium, and they concentrate mostly on interindustry distortions. Ranking the six plans by the size of the gain, results indicate that extensive inflation indexation of the U. S. tax system would yield the largest annual static efficiency gain, more than $4 billion (1973 dollars). Excluding 60% of dividends from the personal tax base would have an effect about half as large, while indexing capital gains alone would further reduce the gain. Proposals to exclude 70% of interest income from the personal tax base or to decrease the capital gains inclusion to 30% augment welfare still less. A plan to increase pension, Keogh, and IRA maxima and to expand their scope engenders fairly small static welfare gains because they do not operate so as to decrease interindustry distortions in the allocation of capital.

Our dynamic measures of welfare gain are derived by comparing an entire sequence of equilibria under the new-tax regime to the sequence generated from the 1973 tax regime. It not only captures gains from reducing capital misallocation, but also records intertemporal efficiency gains from reducing the "double tax" on savings. Dynamic effects exceed static ones, and our analysis indicates that the extensive indexation plan may yield gains whose present value is approximately $200 billion, or about 1/2 of 1% of the discounted present value of an "expanded" income stream to the U. S. economy after correction for population growth.[1/] The dividend exclusion yields present value gains of about $100 billion, while the other plans are less successful. Plans differ in their distributional impacts, although these findings depend on the nature of replacement taxes used to preserve government revenues. The size of dynamic resource allocation effects are sensitive to the choice of the replacement tax, while static gains are more robust.

The relative magnitude of the gains involved depend largely on one's perspective. They could be treated as upper bounds, since the disequilibrium losses likely to be incurred are not captured in our model. On the other hand, the size of the gains is reduced by our assumption that financial policies do not change. The best plans discussed here offer welfare benefits approximately as large as those accruing with the complete integration of the corporate and personal income taxes, as discussed in Fullerton, King, Shoven, and Whalley (1980a and 1980b).

At least four choices greatly influence the size of welfare gains and the proportions of those gains derived from removal of interindustry and intertemporal distortions. First, we employ 0.4 for the uncompensated savings elasticity with respect to the net rate of return. Intertemporal distortions would be greater, and hence their role more important, if this elasticity were higher.[2/] Second, we use .04 to discount future welfare gains from intertemporal corrections. These would be more (less) significant if a larger (smaller) discount rate were used. Third, since each of the plans involves at least a short-term revenue loss, we assume that the government balances its budget by scaling up personal marginal tax rates or by imposing lump-sum taxes on consumers. We describe this scaling procedure more thoroughly in Section III. Because scaled marginal rates apply to income from both labor and capital, the effect is to remove only a portion of the intertemporal distortion while allowing any given reform plan to have full interindustry effects. Fourth, our estimates of the elasticity of substitution between capital and labor in each industry vary between 0.6 and

1.0. Higher elasticities of substitution would imply larger interindustry distortions. Consequently, the relative size of gains from the removal of interindustry and intertemporal distortions cannot be forecast with precision. Our results make it apparent, however, that the order of magnitude of the gains is similar.

I. Saving, Inflation, and Income Taxation.

The U. S. tax system's treatment of capital imposes two major types of distortion. The first of these is an intertemporal one. Savings occur of of after-tax income, yet its return may be taxed again by both the corporate and personal income taxes. This additional taxation has the effect of raising the cost of saving, thus biasing consumption plans towards the present and away from the future. The second large distortion is an interindustry one. Different industries incur different effective capital tax rates due to varying degrees of incorporation, age structures of assets, debt/equity ratios, and other financial policies. Rational investors will equalize rates of return net of all taxes that discriminate by industrial location. Therefore, as producers set the marginal cost of capital equal to its marginal product, the latter must differ by industry. Reallocation of capital from low to high marginal product industries could consequently increase total product.

Both intertemporal and interindustry distortions are aggravated by the presence of inflation. With respect to taxes on labor income, the progressive nature of the personal income tax (PIT) ensures rising marginal and average tax rates for individuals as inflation occurs, unless rates are systematically reduced. Since saving varies positively with real income, the effect of inflation through its impact on the personal income tax may be to reduce private saving.

With respect to taxes on capital income, inflation creates illusory capital gains which are nonetheless taxed as if they were real. The value of shares in an industry should rise by an amount approximately equal to the inflation rate times that industry's ownership of capital stock, and these purely nominal gains are then taxed as income. Inflation simultaneously reduces the real value of permissable depreciation deductions for calculating the corporate or personal income tax base. Furthermore, with the deduction of interest payments and inclusion of interest income in tax bases, inflation lowers the effective rate of tax on borrowers and increases the rate on lenders. Because industries differ with respect to (a) the proportions of capital gains that are real and nominal, (b) the age structure of their assets, and (c) the proportion of investment financed by debt, the effect of inflation will not only increase capital taxes on real capital income, but will do so differentially by industry.

The present tax system thus contains a considerable anti-savings bias, aggravated by its inflation non-neutrality. Consequently, there exists a prima facie case for encouraging saving through the tax system and its treatment of inflation. Since proposals to increase saving through the tax system do so by increasing the return to postponed consumption, and as inflation increases effective personal and corporate income tax rates, proposals to promote saving tend to partially offset the real effects of inflation. Conversely, attempts to make taxes on labor and capital income inflation neutral[3/] will increase the real return to saving. Welfare effects of a plan to raise savings and reduce intertemporal distortions will be heavily influenced by the reform's impact on reducing interindustry distortions caused by inflation, and vice versa.

Advocates and opponents of various proposals to increase saving and index taxes have taken sides with necessarily partial knowledge of their plans' long term productive and distributive impacts. Our estimates below show that the effects of typical proposals on national income vary considerably, while distributive impacts range from extremely regressive to approximately neutral. The remainder of the paper evaluates some of these tax reform proposals by simulating them in a dynamic general equilibirum model of the U. S. economy.

This model, developed by Fullerton, Shoven, and Whalley for the U. S. Treasury Department, is based on disaggregated micro data. It captures the effects of a tax change on factor prices and output prices, thus measuring both the sources side and uses side of income simultaneously. The initial parameters are obtained in a manner that allows us to replicate the 1973 U. S. economy as an equilibrium. We assume that the 1973 economy was both in equilibrium and that it was on a steady-state growth path. Welfare impacts of a proposal are then determined by calculating its model-equivalent form, obtaining an equilibrium for a counterfactual economy in which the reform has been implemented, and then comparing this economy to the unaltered base equilibrium sequence.

The next section formally introduces and describes six concrete proposals for tax structure reform. These plans are similar at least in spirit to existing proposals in government and political circles. The third section discusses the general equilibrium model used to evaluate the proposals and notes the sources for the data and exogenous parameter values employed. Section IV considers the simulation results obtained, while a concluding section summarizes the insights they reveal. Finally, in an Appendix we specify how each tax proposal is translated into modelled rate and equation changes for the purpose of calculating the counterfactual economy.

II. Six Reforms.

The first proposal considered, P1, is a plan to raise the maximum amounts deductible for employer or employee contributions to pension plans, Keogh self-employment plans and IRA retirement accounts.[4/] The plan's primary goal is to encourage saving, and it does far less to remove inter-industry distortions or to correct for inflation. Increasing these maxima effectively serves to reduce the proportion of an individual's savings subject to taxation, and thus reduces the intertemporal distortion caused by the tax system. In principle, any plan to expand pension/Keogh/IRA coverage or to raise their ceilings has an ambiguous effect on inducing new savings. While the price effect is clearly positive, since the effective cost of postponing consumption is reduced, the income effect is likely to have a negative impact. Since we use an estimate from Boskin (1978) of .4 for the uncompensated elasticity of savings with respect to the net rate of return, our results show that P1 does have a strong, positive impact on savings.

The second proposal considered, P2, makes 70% of personal interest receipts deductible from the personal tax base. While P2's supporters may intend to encourage saving and partially index capital income against inflation, the latter goal is not systematically achieved. Nominal interest income is already deductible on the borrower's side. As corporate business is a major net debtor, this treatment means that inflation could have a negative effect on real tax rates for interest income, more than removing any double taxation. The plan may exacerbate the debt/equity distortion already existing with the corporate income tax on only equity income.

Since only certain forms of savings are encouraged by an interest income exclusion, one would expect it to be a less potent savings inducement than liberalization of the pension programs.[5/] It might have a larger welfare gain, however, since the interest exclusion generates reductions in interindustry and other distortions, as industries with disproportionately large amounts of debt finance tend to be relatively highly taxed by corporate or other tax systems.

The third proposal consists of the imposition of a 60% dividends exclusion from the personal income tax base[6/] combined with the elimination of the $100 dividend deduction.[7/] As the value of the $100 deduction amounts to only about 4% of dividends paid in 1973, the net effect is to substantially reduce the average rate of taxation on personal savings. The effect on the marginal rate is still stronger: those with dividend income above $100 receive the majority of dividend income. Therefore, the $100 deduction is primarily a lump-sum transfer to dividend recipients, and has little impact on marginal tax rates. Since dividends as a return to savings are taxed at both the corporate and personal level, increasing the exclusion helps eliminate an important source of intertemporal distortion. Furthermore, due to different rates of incorporation and financial policies across industries, the extra tax on dividends implies various rates among various industries. The efficiency gains from dividend exclusion may therefore be especially strong.

P4 is based on a recent proposal by Senator Russell Long (D.-La.) to reduce the percentage of capital gains includable in the personal income tax to 30%. While P4 may be partially intended to counteract the rising effective capital tax rates due to inflation, it does so in an ad hoc manner. Its main consequence is to raise the rate of return to holding corporate stock. As with P2 and P3, only one of several forms of savings receives a reduction in intemporal distortion, and then only a partial one. Their relative potencies will depend on the extent to which interindiustry distortions are also lessened. Welfare gains will also be affected by the plans' distributional impacts, primarily because of different propensities to save. Since high income consumers save a higher proportion of their incomes, a progressive (regressive) tax change will tend to reduce (increase) the aggregate proportion of income saved.[8/]

In contrast to P4, the next plan does involve the inflation indexation of capital gains. The added real tax burdens on capital gains income imposed by inflation may cause significant net welfare losses, as well as creating large income redistributions. On the other hand, an inflation indexation proposal would be slightly more difficult to implement than any of the plans previously discussed. Any scheme would be necessarily imperfect since a perfect price index does not exist. Once a price index is chosen, the base purchase price used in the calculation of capital gains can be readily adjusted upward by a factor $\prod_{t=1}^{T}(1+\pi(t))$, where $\pi(t)$ is the inflation rate in year t, and T is the number of years for which the asset is held. In our calculations we compare indexation to a benchmark equilibrium with a perpetual 7% inflation rate, the rate recorded in 1973. The degrees of excludability allowed in P2 and P3 were chosen with the intention of making them comparable in terms of additional capital formation to P5.

The final proposal considered, P6, is one designed to almost completely index taxes on income from capital against inflation.[9/] It is the only plan involving changes to tax laws other than on the personal income tax. P6 includes the indexation of depreciation deductions for corporate income taxes, incorporates the indexation of capital gains, and also involves changes in the treatment of interest income. Taxation of dividends at a constant rate with only insignificant deductions renders its taxation approximately inflation-neutral. The other major taxes such as those on property and rent income, are also approximately _ad valorem_ taxes on factor income, and as such are inflation neutral. In general, any tax levied in an _ad valorem_ fashion, either on a product or on a factor's income, will be inflation neutral. A tax with a variable average rate or which taxes nominal value that fails to increase _pari passu_ with inflation will have its effective rate vary with inflation.

Depreciation allowance indexation requires that each corporate or noncorporate firm's taxable income in year k be reduced by the amount $\prod_{t=k'}^{k} (1+\pi(t))\cdot DEPR(k)$ where k' is the year in which the firm's capital assets were purchased and DEPR(k) is the historical cost depreciation allowance in year k. Obviously, the computational problem grows in complexity when one admits the possibility that firms purchase various assets in different years. Nonetheless, the practical problems of implementation are far from insurmountable.

Indexation of capital gains corresponds exactly to that of plan 5. Finally, interest indexing in P6 involves the deduction of interest income from the _personal_ income tax base equal to the rate of inflation times the base value of interest-earning assets. However, deduction of interest payments from the _corporate_ income tax base must be cut by $\pi(t)$ times the value of their interest-receiving liabilities. Household interest deductions on $\pi(t)$ times their interest bearing liabilities are also barred.

Given the above tax adjustments, the only significant impact of unanticipated inflation on real capital income earnings will be to impose lump-sum gains on debtors and losses on lenders. When P6 is implemented, a corporation's capital tax rate will be unchanged by inflation regardless of its financial policies. Individuals are taxed only on the returns to their investments, rather than on the returns plus $\pi(t)$ times their interest-bearing assets.

III. The General Equilibrium Model.

We use an empirical general equilibrium model previously developed by Fullerton, Shoven and Whalley to simulate the effects of different tax reform proposals.[10/] It has been constructed as a general purpose model, but is particularly well suited to analyze specific tax policy changes. Its construction from disaggregated microeconomic data allows interindustry distinctions unobtainable in most macroeconomic models. A brief outline of the model is provided here.

The economy is divided into nineteen profit-maximizing industries, each of which produces a single output from a combination of capital services, labor services, and the outputs of other industries. Capital services are in fixed supply during a given period, but grow over time as investment occurs. Labor endowment is in fixed supply at any instant, but grows over time at a constant rate. Labor supply in any period is variable and equals aggregate labor endowment less leisure time. Labor supply is thus determined by leisure demands, which depend on relative prices and income. Both labor and capital are perfectly mobile across industries.

Each industry has a Cobb-Douglas or other Constant Elasticity of Substitution (CES) production function over primary inputs, where the elasticity of substitution is chosen as a "best-guess" value from evidence in the literature. Each output is used in part as an intermediate input through a fixed-coefficient input-output matrix. Outputs can also be purchased by government, used for investment, or be converted via a fixed coefficient transformation into one of fifteen consumer goods. There is a simple foreign trade sector to close the model, but for all practical purposes this model of the U. S. economy should be considered to be a closed one.

There are twelve consumer classes, differentiated by their 1973 income levels. Consumers in each class possess initial endowments of labor and capital services which can be sold for use in production or to government. Perfect factor mobility and perfect competition combine to ensure equality of the net-of-tax return among industries. As noted above, a consumer can also choose to buy some of his own labor endowment as leisure. We model all government transfers as essentially lump-sum payments to consumer groups in proportion to their observed 1973 receipts from social security, unemployment compensation, food stamps, and other welfare programs.

Consumer demand functions are based on CES utility functions with double nesting. The choice between present and future consumption is represented by the outside nest, and the elasticity of substitution between those two types of consumption is based on an estimate of the uncompensated savings elasticity with respect to the net-of-tax rate of return. We use the value of 0.4 found by Boskin (1978). The breakdown of present consumption into commodities and leisure is represented by the inside nest, and the elasticity of substitution between those two subsets is based on an estimate of the uncompensated labor supply elasticity with respect to the net-of-tax wage. For this latter value we use 0.15. This choice is discussed in Fullerton (1980a). All classes have the same form of utility function, and identical labor supply and savings elasticities. They do have different demands for all commodities, however, with the parameters determined from Consumer Expenditure Survey data.

The various Federal, state and local taxes are typically modelled as <u>ad valorem</u> tax rates on purchases of appropriate products or factors. Corporate income taxes and property taxes are modelled as different effective rates of tax on use of capital by industry. Social security, workmen's compensation and unemployment insurance appear as industry taxes on labor use. Personal income taxes operate as different linear schedules for each consumer group, with marginal tax rates increasing from an average of 1% for the lowest income group to 40% for the highest income group.

In our benchmark model inflation has effects on real taxes through the capital gains and interest income taxes and by the use of depreciation allowances based on historical costs. Consequently, inflation has the real effect of altering each industry's tax on use of capital services and hence its effective price of capital services. On the other hand, the inflation rate remains an exogenously specified parameter. There is an implicit presumption in the model that various tax policies do not have differential impacts on the inflation rate itself. Instead, the model has been adjusted to obtain different effective capital tax rates for different inflation rates. Effective capital tax rates are calculated by measuring each industry's real use of capital services with replacement cost depreciation.

The model is parameterized for 1973 using data from the National Income and Product Accounts, the Bureau of Labor Statistics' Consumer Expenditure Survey, and the Treasury Department's merged tax file. These data are adjusted for known inaccuracies of government collection procedures and for general equilibrium consistency requirements.[11/] This "benchmark" data set is used to solve backwards for relevant preference parameters and tax rates, so that the model solution can replicate the benchmark equilibrium. The user can specify different tax rates and equations to recalculate a simulated "counterfactual" equilibrium with different resource allocations for comparison with the benchmark. The model is solved using Merrill's variant of Scarf's algorithm for an equilibrium price vector where excess demands and profits are zero.

Capital accumulation occurs through the act of saving by consumers and replacement investment by firms, less depreciation. Savings is treated as the sixteenth consumer good, and involves the purchase of producer goods in fixed proportions to form a composite investment good. The conversion from expected future consumption to demand for savings is based on a myopic expectations assumption: consumers take the current return to capital as the expected future return in deciding how much to save. In a steady state, this myopia will turn out to be realistic.

The notion of a static benchmark equilibrium is extended to a benchmark steady state in which all values grow proportionately at the effective labor force growth rate. Labor force growth is evenly divided between population changes and Harrod-neutral technical progress. A tax policy change causes divergence from the original steady state path, and alters the economy's factor ratio and utility levels at any instant. The model's essential convexity makes asymptotic convergence to a new steady state path an almost certain event. The new steady state is characterized by a new constant ratio of effective labor units to capital service units and unchanging relative prices. The net advisability of a policy change will depend on the size and timing of changes in consumer utility levels, the distribution of those changes, and the discount rate used to compare the two sequences.

It is important to recognize the somewhat limited sense in which we simulate general equilibria. Various financial policies are captured in our modelling of capital income distribution flows, but we assume these policies to be fixed because we have no estimates of the elasticities of corporate financial policy with respect to the effective prices of finance. Therefore, for example, a reduction in the dividends includability in the PIT base does not induce corporations to alter the fraction of net income they distribute as dividends. This assumption of corporate non-responsiveness causes the present value estimates to be biased downwards. Sensitivity analysis can be performed by allowing corporations to alter their financial patterns in a logical direction but by an essentially arbitrary amount. This strategy has been pursued in a study of other tax policy changes.[12/] It has been found that extreme corporate reaction assumptions lead to welfare gains of roughly 50 to 100% more than the gains registered in the nonresponsive case.

The model as specified does not include aspects of disequilibrium such as factor unemployment. It measures real effects without a money equation, expressing all prices in relative terms. Voluntary unemployment is captured through the labor/leisure choice, though, and the interaction of exogenously specified inflation with effective tax rates is modelled by adjusting those rates appropriately. The model is thus complementary to short-run Keynesian disequilibrium models rather than competitive with them.

Finally, the model requires that government run a balanced budget.[13/] Therefore, when policy changes generate alterations in the tax equations and parameters, the revenue gain or loss implied cannot be recorded as a government surplus or deficit. The model further specifies that the government obtain a specific real value of goods and services over time, with its purchasing power defined by means of a Laspeyres price index. Consequently, each policy change that implies a loss of government purchasing power must be compensated by a tax increase that just offsets that loss. The model is constructed to allow for automatic changes in the income tax structure to provide the extra tax to maintain an "equal yield." This equal yield can be realized by imposing a lump-sum tax on all consumer groups in proportion to their initial net incomes, or by increasing the marginal tax rate of each class by a constant amount (additive scaling), or by multiplying the marginal rate of each class by a constant fraction (multiplicative scaling). This last method can impose severe deadweight losses on the economy, because proportionately more of the revenue is obtained from the high-income, high-saving class. Some might prefer its progressive nature, however, since the capital tax reductions of the six proposals are often regressive. Rather than comment on the desirability of different distributional impacts, we present the reader with alternative replacement taxes. The tradeoff between efficiency and distributional impacts will be noted below.

IV. Results.

Table 1 presents the dynamic welfare gains, measured as the present value of compensating variations for all classes over time. This measure will include both intertemporal and interindustry efficiency effects. For the dynamic welfare effects we evaluate the instantaneous utility over current consumption and leisure in each period. That is, letting C_f denote future consumption, L denote leisure, and X_i $(i=1,...,15)$ denote each of the current consumption goods, we evaluate the "H"s in the

TABLE 1

Dynamic Welfare Effects in Present Value of Compensating Variations Over Time*
(in billions of 1973 dollars)

TAX REPLACEMENT	TYPES OF SCALING TO PRESERVE TAX YIELD		
	Lump-Sum**	Multiplicative**	Additive**
Proposal 1: Pension Liberalization	57.605*** (.127)	33.666 (.074)	39.653 (.087)
Proposal 2: Interest Deduction from Personal Income Tax	91.717 (.202)	35.714 (.079	47.795 (.105)
Proposal 3: Dividend Exclusion from Personal Income Tax	115.646 (.254)	84.054 (.185)	90.897 (.200)
Proposal 4: Increased Capital Gains Exclusion from Personal Income Tax	52.176 (.115)	31.706 (.070)	35.805 (.079)
Proposal 5: Indexing Capital Gains For Inflation	92.562 (.203)	61.678 (.136)	68.171 (.150)
Proposal 6: Extensive Inflation Indexation	287.234 (.631)	178.236 (.392)	201.855 (.444)

*These welfare measures involve calculating a sequence of momentary equilibria through time with increments to the capital and labor service endowments of the economy through savings and population growth. We consider ten equilibria at 5 year periods with an appropriate treatment of the terminal conditions. The dynamic compensating variations are analogues of static concepts applied to the consumption sequence over time assuming the first period discount factor is unchanged.

**The types of scaling are explained in the text.

***The numbers in parentheses represent the gain as a percentage of the discounted value of welfare (consumption plus leisure) in the base sequence. This value is $45 trillion for all comparisons, and accounts for only a population the size of that in 1973.

TABLE 2

Selected Effects of the Six Tax Reform Proposals

	(1) Expanded Income Change ($ billions)	(2) National Income Change ($ billions)	(3) Revenue Shortfall ($ billions)	(4) Cost Effectiveness Ratio	(5) Initial Relative Price of Capital	(6) Final Relative Price of Capital	(7) Initial Change in Savings (%)	(8) Final Change in Savings (%)	(9) Final Change in Capital Stock (%)
Proposal 1: (Pension liberalization)	.204 (.012)	.406 (.032)	2.673	12.59	0.998	0.972	4.184	4.199	3.053
Proposal 2: (Interest Deduction from the Personal Income Tax)	.857 (.051)	-.055 (-.005)	4.357	8.20	1.017	1.012	0.834	0.848	0.614
Proposal 3: (Dividends Exclusion from the Personal Income Tax)	1.763 (.104)	1.155 (.092)	2.493	33.72	1.015	1.008	1.135	1.138	0.828
Proposal 4: (Increased Capital Gains Exclusion from the Personal Income Tax)	.572 (.033)	.223 (.017)	1.612	19.67	1.008	1.004	0.641	0.644	0.468
Proposal 5: (Indexing Capital Gains for Inflation)	1.188 (.070)	.634 (.050)	2.465	25.02	1.013	1.006	1.074	1.080	0.785
Proposal 6: (Extensive Inflation Indexation)	4.183 (.248)	2.026 (.162)	8.681	20.53	1.048	1.027	3.215	3.267	2.364

Column (1): The figures represent static welfare gains (with multiplicative scaling in $ billions), equal to changes in annual real expanded income. The latter includes national income plus leisure valued at the household net-of-tax wage. A geometric mean of Paasche and Laspeyres price indices are used to obtain real changes. The figures in parentheses are the percentage changes in expanded income caused by each reform.

Column (2): This column gives additions to national income, (with multiplicative scaling) again using the geometric mean of old and new prices. Figures in parentheses give the gains as a percent of national income (excluding leisure).

Column (3): The numbers in this column represent the first year's revenue shortfall (in $ billions) caused by each proposal. This is the value of the lump-sum tax that must be levied on individuals in the new equilibrium (with lump-sum scaling) to preserve government purchasing power.

Column (4): This is the "cost-effectiveness" measure, equal to the ratio of the dynamic welfare gain (with multiplicative scaling) divided by revenue shortfall.

Column (5): These figures give the first year's price of capital services relative to the price of labor services (when multiplicative scaling was used in the simulation). In the benchmark steady state equilibrium sequence the relative price of capital services equals 1 throughout all periods.

Column (6): The same relative price as in Column 5, but for year 50. These should be close to the new steady state price ratios.

Column (7): These figures are the first year's percentage changes in saving over the benchmark values induced by the proposed reforms (with multiplicative scaling).

Column (8): The last period's savings from the reform sequence as a percent of the same period's savings in the benchmark sequence (with multiplicative scaling).

Column (9): The figures represent the percentage change in private capital endowment in year 50 induced by the proposed reforms (with multiplicative scaling).

TABLE 3

Percentage Changes in Expanded Real Income* after Taxes and Transfers by Income Class, for Each Tax Replacement

Consumer Group (Income Brackets)	Proposal 1: Pension Liberalization		Proposal 2: Interest Deduction From Personal Income Tax		Proposal 3: Dividend Exclusion From Personal Income Tax		Proposal 4: Increased Capital Gains Exclusive From Personal Income Tax		Proposal 5: Indexing Capital Gains for Inflation		Proposal 6: Extensive Inflation Indexing	
	Add.**	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.
0-3,000	-.136	.066	-.146	.166	-.039	.143	-.074	.046	-.089	.091	.310	.935
3-4,000	-.147	.027	-.081	.191	.013	.171	-.040	.063	-.038	.118	.283	.827
4-5,000	-.152	-.004	-.060	.173	.037	.172	-.021	.067	-.013	.121	.231	.697
5-6,000	-.138	-.004	-.043	.169	.056	.179	-.013	.068	.004	.126	.263	.687
6-7,000	-.125	.000	-.043	.155	.071	.186	-.001	.075	.020	.134	.273	.670
7-8,000	-.107	-.002	-.036	.131	.083	.180	.007	.071	.034	.130	.266	.600
8-10,000	-.074	.006	-.024	.103	.092	.166	.013	.062	.043	.117	.249	.504
10-12,000	-.015	.036	.013	.094	.130	.177	.033	.065	.078	.125	.328	.490
12-15,000	.046	.082	.019	.076	.146	.179	.046	.068	.094	.127	.357	.469
15-20,000	.149	.135	.088	.064	.196	.182	.072	.064	.141	.128	.450	.402
20-25,000	.252	.201	.183	.100	.273	.225	.117	.087	.211	.164	.637	.471
25,000 +	1.269	1.037	1.342	.975	1.139	.923	.612	.471	1.002	.791	2.619	1.881

*Expanded Real Income includes leisure, valued at the household net-of-tax wage rate. Numbers shown are the arithmetic means of percentage changes to income based on Paasche and Laspeyres price indices.

**The percentage changes are shown for additive scaling of marginal tax rates for revenue replacement, then for multiplicate scaling.

TABLE 4

Capital Tax Rates* By Industry

	Benchmark**	Proposal 2 Interest Deduction from Personal Income Tax	Proposal 3 Dividend Exclusion from Personal Income Tax	Proposal 4 Increased Capital Gains Exclusion from Personal Income Tax	Proposal 5 Indexing Capital Gains for Inflation	Proposal 6 Extensive Inflation Indexing
$\bar{f}$***	.70	.61	.64	.66	.64	.60
Agriculture·Forestries·Fisheries	.47	.44	.47	.47	.47	.43
Mining	.87	.82	.80	.80	.78	.69
Crude Petroleum & Natural Gas	.88	.87	.64	.85	.79	.74
Construction	1.94	1.73	1.81	1.86	1.79	.99
Food and Tobacco	3.20	2.83	2.73	3.12	2.95	2.08
Textiles, Apparel, Leather	2.36	2.10	2.15	2.27	2.17	1.75
Paper and Printing	1.52	1.49	1.40	1.43	1.39	1.17
Petroleum Refining	.42	.41	.44	.36	.35	.33
Chemicals and Rubber	1.75	1.68	1.55	1.65	1.60	1.29
Lumber·Furniture·Stone	.85	.82	.80	.77	.76	.69
Metals and Machinery	1.61	1.50	1.48	1.52	1.47	1.21
Transportation Equipment	19.21	13.49	11.56	20.86	17.14	4.29
Motor Vehicles	1.20	1.13	1.07	1.12	1.08	1.00
Transportation, Communication, Utilities	1.53	1.23	1.30	1.49	1.38	1.09
Trade	1.73	1.66	1.60	1.64	1.59	1.33
Finance and Insurance	1.80	1.80	1.75	1.72	1.75	1.56
Real Estate	.58	.53	.58	.58	.58	.56
Services	.68	.64	.67	.67	.66	.58
Government Enterprises	.26	.26	.26	.26	.26	.26

*Capital tax rates are defined as total capital factor taxes over capital income net of all taxes.

**The tax rates for Proposal 1 (pension liberalization) are identical to the benchmark rates because only consumers' savings subsidies are affected.

***$\bar{f}$ is the average proportion of capital income taxable by the personal income tax. It is further explained in the text and appendix.

individual nested utility functions

$$U(\ H(X_1,\ldots,X_i,\ldots,X_{15};\ L)\ ;\ C_f) \quad . \tag{1}$$

We then obtain the number of dollars needed to pay each consumer in each period to be able to reach the H sequence of the benchmark, and discount those dollars by the assumed 4% discount rate.

Table 2 presents a number of summary statistics for the six plans, including the static or annual measures of welfare gain in columns 1 and 2. The static measures of efficiency shown in column 1 are the changes in expanded income, defined as the sum of national income plus leisure, evaluated at the geometric mean of pre- and post-policy change prices. Column two gives the percentage change of national income alone, and can thus be affected by labor/leisure choices. We use the real income figures rather than compensating or equivalent variations in static comparisons because the utility contribution of savings may be inaccurately assessed by consumers due to their myopic expectations.

Column 3 shows the revenue shortfalls generated by the various proposals when revenues are replaced by lump-sum taxes on consumers. This type of replacement tax was used here to isolate the effects of the plan without combined effects from scaling marginal tax rates. A "cost-effectiveness" ratio, equal to the dynamic welfare gain with multiplicative scaling divided by this first year revenue shortfall is also computed and shown in column 4. Column 5 presents the relative price of capital services in the first year and column 6 the relative price of capital in year 50. The latter set of figures should be close to the steady state price ratio. Column 7 gives the first year's percentage increase of savings over the benchmark value for each reform, while column 8 gives the same figure for year 50. Finally, column 9 provides the percentage increase in capital stock after 50 years with each reform.

Table 3 presents the twelve income classes along with the distributional results of each plan. We examine only the initial distribution effects from the static model because the dynamic model is not able to obtain satisfactory estimates of distributional impacts. Table 4 shows the nineteen industries in the model, and presents a comparison of capital tax rates by industry for the six plans.

Examining Table 1 first, it is apparent that the P6 extensive indexing plan dominates all other proposals by large amounts, regardless of the replacement tax. Welfare gains are about $200 billion in present value. Results of sensitivity analysis suggest that the added depreciation deduction accounts for most of the gain. A reason for the strong showing of both P6 and the P3 dividends exclusion proposal, with about $100 billion of gains, lies largely in their removal of interindustry distortions. They both go a long way towards reducing taxes on capital and thus much intertemporal distortion as well.[14/] In fact, the gain from inflation indexing is nearly equal to the elsewhere estimated gain from full integration of the corporate and personal income taxes.[15/] It is also evident from Table 1 that there is a sizeable welfare gain to be had from the P5 indexing capital gains alone, over $60 billion. This exceeds by more than $30 billion the gain from P4 (increasing the capital gains exclusion to 70%). To help explain this result, turn briefly to Table 4, which suggests that P5 (gains indexing) is more successful than P4 (gains exclusion) in reducing the effective capital tax rates on those industries with particularly high rates, thus giving it a stronger interindustry effect. That it also reduces $\bar{f}$ (the average proportion of capital income taxable by the personal income tax) by a larger amount attests to its superior ability in reducing intertemporal distortions as well.

The dynamic welfare benefits from adopting P1 (pensions liberalization) or P2 (interest exclusion) are comparable to the gains from implementing P4 (capital gains exclusion). This result in itself is noteworthy, since it suggests that interindustry effects are extremely important. P1 offers purely intertemporal efficiency gains, and P2 offers large intertemporal benefits relative to P4.[16/] Nonetheless, P4 compensates by achieving greater interindustry gains than P1 or P2. Note, however, that the weight of the intertemporal gains is apparently greater for the lump-sum replacement, where intertemporal efficiency gains are not offset by revenue-preserving taxes on both labor and capital income.

The static welfare results in the first two columns of Table 2 conform to the pattern set in Table 1, with the exception of a reversal of ranking of P4 (capital gains exclusion) and P1 (pensions liberalization). Pension liberalization looks relatively worse here because the static measures do not adequately capture intertemporal effects, where it is strongest. P2 (interest exclusion) does relatively better, though in the case of multiplicative scaling for tax replacement it actually induces a fall in national income.

Turning to column 3 of Table 2, it is seen that the extensive indexation package requires a much larger income tax increase to offset its implementation than does any other plan. The interest exclusion plan also demands a rather large replacement tax, particularly relative to the size of the welfare gain it offers. Proposals 3 (dividends exclusion), 4 (gains exclusion) and 5 (gains indexation) require relatively small replacement taxes, and thus have high cost-effectiveness ratios, shown in column 4.

While the cost-effectiveness ratio provides a rough indicator of net benefits per dollar of tax revenue, it does not demonstrate that these plans are most desirable in the sense of providing the largest net gains or savings increases.

The price of capital services relative to the price of labor services appears in columns 5 and 6 in Table 2. The expected return to saving in this model is

$$r = \frac{P_k \cdot \gamma}{\bar{P} \cdot P_s} , \tag{2}$$

where P_s is the price of the composite savings or investment good, P_k is the relative price of capital services in columns 5 or 6, γ is the four percent real net-of-tax rate of return to capital assets, and $\bar{P}$ is the expected composite relative price index of consumption goods anticipated to prevail in the following periods.

Except for the pension liberalization proposal, which raises the rate of return by providing a savings subsidy (reduces P_s), the increases in P_k largely mirror the increases in r induced by the reforms. Ignoring the insignificant changes that occur in gross P_s and $\bar{P}$, the effect of pension liberalization is to increase r by 3.03%. Long-run increases in P_k (and therefore r) are merely 0.4% for P4 (gains exclusion), 0.6% for P5 (gains indexation), 0.8% for P3 (dividends exclusion), and 1.2% for P2 (interest exclusion), but amount to some 2.7% when extensive inflation indexation is implemented. As they have the largest impacts on r, P1 and P6 will generate the largest purely intertemporal welfare gains. Note that the savings responses that ensue tend to moderate the degree to which P_k increases over time, as capital/labor ratios increase. The tendency to absorb part of the efficiency gains in increased leisure time further raises the capital/labor ratio.

Columns 7 and 8 of Table 2 present savings responses to each of the proposals. P1, the direct savings subsidy, has the largest impact, followed closely by the extensive indexation plan. The other savings plans generate an amount of savings roughly 1% over the benchmark case in each year. Column 9 provides similar information, that P1 and then P6 do the most to raise future capital stocks through savings.

Looking at the distributional patterns appearing in Table 3, importance of the form of tax replacement is evident: multiplicative scaling greatly enhances the gains or reduces the losses of the poorer classes. On the other hand, multiplicative scaling induces lower welfare gains in both the static and dynamic present value estimates than either other replacement. It has been found both here and elsewhere that a strong tradeoff exists between the size of the welfare gain and its distribution to the poorer classes.[17/] This is only mitigated on occasion by the fact that the very bottom income groups, consisting largely of retirees, own significant amounts of capital.

All proposals are regressive when additive scaling is used for tax replacement. In the case of P1 (pension liberalization), the first eight classes are made worse off. P6 (extensive indexation) is only weakly regressive under additive scaling, and no class is made worse off.

Examining the distributional effects with multiplicative scaling for tax replacement, we find that all plans show bimodal curves for percentage benefit gains. This stems from the U-shaped distribution of the capital/labor ratio across income classes, so that any plan which increases P_k or cuts taxes on capital will tend to have a U-shaped distribution of gains.

P1 remains a somewhat regressive plan. With the exception of benefits accruing to the twelfth income class, the distribution effects of P3 (dividends exclusion) and P4 (gains exclusion) are not far from being proportionate. Again excluding the twelfth class, P6 (extensive indexation) even enjoys a progressive distribution of gains. All proposals provide a percentage gain to the richest class far larger than to any other class. P6, however, is a Pareto improvement in the sense that every class is made better off regardless of the tax replacement.

The capital tax rates presented in Table 4 are valuable for comparisons of relative interindustry tax differentials. The rates do not include certain pension tax exclusions modelled as general savings subsidies. A cursory glance shows that of the proposals modelled as directly affecting the capital tax rates (P2 through P6), P6 (extensive indexing) reduces capital tax rates by a far larger amount than do the others. It seems especially effective in reducing tax rates for the most heavily taxed industries, and thus yields more interindustry gain as well as intertemporal gain.

Most of the results obtained are consistent with *a priori* expectations. The gains accruing to the proposals involving increased exclusions (P2, P3, P4) largely reflect the fact that they represent movements towards personal and corporate tax integration. The size of the gains from indexing schemes attest to the importance of inflation in increasing both intertemporal and interindustry distortions. Obviously, these welfare impacts would have been even more important if 1980 data had been available so that 1980 inflation rates could be used.

V. Conclusion.

This paper analyzes six alternative plans to increase savings by cutting taxes on capital income. The capital tax cuts appear in different forms, and include efforts to reduce the real impacts of inflation on the taxation of real income. We employ a recently constructed general equilibrium model for the U. S. economy and tax system. The paper discusses the model and its use of disaggregated data in the third section, and outlines the model equivalent forms of the proposals in an appendix.

Extensive indexation of capital taxes for inflation is shown to yield present value dynamic gains of about $200 billion, comparable to the welfare gains obtainable from integration of the personal and corporate income taxes. A 60% exclusion of dividends from the personal income tax offers gains of about $100 billion, based on the assumption of unchanging financial policies. The gains for indexing only capital gains for inflation are over $60 billion, indicating that this proposal dominates the proposal to reduce the capital gains inclusion to 30%. The distribution of the gains among the income classes is similar for the two proposals.

Both the static and dynamic results indicate that interindustry efficiency gains are of the same order of magnitude as intertemporal ones. The plan most successful in terms of generating new savings and capital formation, P1, is among the least successful in terms of welfare gains measures. The simulations serve to emphasize our first proposition that increased capital is only valuable if used properly. In general, the inflation indexing plans prove effective in achieving both greater capital formation and its proper allocation. As the second proposition notes, the proposals to increase the return to capital in an *ad hoc* manner tend to be less successful in generating welfare gains. One cannot divorce resource allocation effects from a welfare analysis of the impacts of proposed savings incentives.

Dynamic and static gains are highly sensitive to the chosen yield preserving tax, as these taxes impose differing welfare losses themselves. It is apparent that the results will also be highly sensitive to the inflation rate chosen. In general, non-neutrality of the U. S. tax system ensures that inflation will have significant real effects.

As our third proposition states, there is an apparent inverse relationship between the size of welfare gain obtainable and its progressive impact for any particular plan. The cost of increased capital accumulation through reduced intertemporal distortions appears to be a redistribution of income shares from poor to rich.

As a summary observation we draw attention to the one plan which provides gains to all classes, even if the percentage gains differ, regardless of replacement tax assumption. This plan, involving the provision of extensive inflation indexation, also happens to be the plan with the largest dynamic welfare gain, accruing from improvements to intertemporal efficiency and interindustry efficiency. These two strong attributes of the indexing plan are only offset by its possibly greater administrative complexity.

APPENDIX

The general equilibrium model is designed to allow a variety of methods of distributing income from different assets, and to capture the influence of the major taxes imposed on each type of capital income. This Appendix discusses the modelling of capital taxes and personal taxes on capital income, and explains the changes made to the benchmark data set and equations in order to model the proposed reforms.

The capital tax calculation computer program, TMOD, first estimates total returns to capital in each of the nineteen industries. It reads in data on dividends, retained earnings, rents paid, interest payments, unincorporated capital income and imputed interest payments in each industry. We aim to allocate capital according to where it is used rather than by the sector in which the returns are ultimately received. The imputed interest payments prevent the Finance/Insurance industry, which enjoys positive net interest income, from being credited with negative capital use.

Our goal is to determine the capital tax rate (CTR) in each industry as a function of the relevant tax laws, institutional patterns, and financial practices. To find the CTR in an industry, we divide capital taxes by net capital factor income. We define a unit of capital as that amount which earns an annual return of $1 net of all taxes that discriminate according to industrial location. This definition stems from the requirement of a Walrasian equilibrium that marginal factor returns net of all taxes be equalized across industries. Because effective taxation on capital income at the personal income tax (PIT) level depends upon the industry from which the capital income was received, it is necessary to include part of personal tax payments in the tax on income from capital.[18/]

To model this, define KG_i as capital income net of taxes paid at the firm level in industry i but gross of personal income taxes. Also define kg_j as the amount of capital income received before PIT payments by the j^{th} income class. Then

$$\sum_{i=1}^{19} KG_i + KG_{20} = \sum_{j=1}^{12} kg_j \tag{1}$$

where KG_{20} represents the government's use of privately owned capital for its own "consumption" purposes.

Data on the marginal tax rates of each of the consumer classes have been obtained from the Treasury Department's merged tax file. A weighted average marginal tax rate then can be calculated as

$$\tau = \frac{\sum_{j=1}^{12} kg_j \tau_j}{\sum_{j=1}^{12} kg_j} \tag{2}$$

where τ_j is the marginal tax rate of the j^{th} consumer group.

Next, the model defines a fraction f_i for each of the industries and government which denotes the proportion of that sector's capital income which is subject to full personal income taxation. This fraction differs across industries due to a number of features, including the variance in dividend/ retention policies of firms and the degree to which unincorporated capital qualifies for the investment tax credit. In addition to the capital taxes paid directly by industries, there is now another factor tax, t^P, which is labelled the personal factor tax (PFT). Total PFT's paid in an industry are then

$$t_i^p = f_i \tau KG_i \ , \qquad i=1,\ldots,20, \tag{3}$$

where the personal factor tax rate on KG_i is $f_i\tau$.

Introduction of the PFT enables us to define a unit of capital as that asset which earns $1 net of all capital taxes including the PFT. Then the number of units of capital in an industry, equal to net capital income in that industry, is $KN_i = KG_i(1 - f_i\tau)$. We also define $\bar{f}$ as the average fraction of KG_i which is fully subject to the PIT:

$$\bar{f} = \frac{\sum_{i=1}^{20} KG_i f_i}{\sum_{i=1}^{20} KG_i} \ . \tag{4}$$

The new KN_i will be distributed to the 12 consumer classes as kn_j. Since capital income has been subjected to the average PIT rate at the factor level, there is a correction for each marginal tax rate at the personal level. The personal income tax applied to capital income is given by

$$t_j^p = (\tau_j - \tau) kg_j \bar{f} \ , \quad j=1,\ldots,12 \quad , \tag{5}$$

$$= (\tau_j - \tau) \cdot kn_j \frac{\bar{f}}{(1-\bar{f}\tau)} \quad \text{(in net of all tax capital units).}$$

This equation states that corrections at the personal level are based on the average fraction of capital income that is taxable at the personal level.

These consumer taxes on capital income are both positive and negative and when aggregated over the twelve consumer classes yield no revenue. The modelled system operates exactly as a withholding system under which each industry pays tax on $f_i KG_i$ at the average rate τ. The consumer income taxes t_j^p correct the tax rate for each consumer class: those with rates above τ pay more taxes while those below get refunds. Since τ is chosen as the capital weighted average of marginal tax rates, the t_j^p equations above sum over the twelve consumer classes to zero.

Given the f_i's, determination of the capital tax rate in industry i (CTR_i) is straightforward. It equals the sum of the corporate franchise tax (CFT_i), corporate income tax (CIT_i), property taxes (PT_i), and personal factor taxes paid in the i^{th} industry, divided by capital income net of all taxes. That is,

$$CTR_i = \frac{CFT_i + CIT_i + PT_i + t_i^p}{KN_i}, \quad i=1,\ldots,19. \tag{6}$$

To calculate the f_i we make use of data on capital income types by industry, consisting of corporate dividends (DIV_i), retained earnings (RE_i), corporate and noncorporate net monetary interest payments (MI_i) and imputed interest payments (II_i), net rent payments including the rent from owner-occupied homes ($RENT_i$), and the return to capital used in noncorporate business (NCI_i). These types of capital are treated differently by the personal income tax, and each can be said to have a proportion g which is fully taxable by it. An industry's f_i is the weighted average of these g proportions, and each industry has different weights or amounts of these capital income types. Specifically,

$$f_i = [g_{DIV} \cdot DIV_i + g_{RE_i} \cdot RE_i + g_I \cdot (MI_i + II_i) \qquad (7)$$

$$+ \frac{g_{RENT_i} \cdot RENT_i + NCI_i - NCITC_i/\tau\ ]}{(DIV_i + RE_i + MI_i + IT_i + RENT_i + NCI_i)}\ ,$$

where $NCITC_i$ is the noncorporate investment tax credit. Since the $NCITC_i$ reduce the personal income tax liability, we include in the numerator the amount of income which if fully taxable would result in the reduced liability. It is the amount $NCI_i - NCITC_i/\tau$ which when multiplied by τ yields observed tax collections $NCI_i\tau - NCITC_i$. For the housing industry, imputed net rents of owner-occupied homes are excluded from the numerator since this imputed income is not taxable.

In the benchmark case, g_I and g_{RENT} are taken to be one, since interest and rents are entirely subject to the personal income tax. The value of dividend exclusions under the $100 deductability rule amounts to about 4% of dividend payments. For simplicity we treat the exclusion as a fixed percent, rather than a fixed amount, and use .96 for g_{DIV}.

The determination of g_{RE_i} is more complex. The effective proportion of taxable capital gains is reduced by the deferral allowed, assuming retained earnings are immediately capitalized in the value of corporate stock but that the stock is not immediately sold. Estimates of the deferral value suggest that it is considerable; we multiply the percentage of gains includable, PINCL, by 50% to account for this deferral. 1973 tax law provided for 50% inclusion of capital gains in the PIT base, giving PINCL a base value of a half. With inflation, the annual increment in capital gains - that is, the rise in stock value - should exceed the value of retained earnings. Capital gains should also reflect the nominal increase in that industry's capital assets, an amount equal to the inflation rate, π , times $ASSET_i$, the value of assets held by corporations in the i^{th} industry. The increment in nominal capital gains divided by the industry's real capital gains is then $(\pi \cdot ASSET_i + RE_i)/RE_i$. Finally, before this amount can be multiplied by the deferral factor and PINCL, recognition must be taken of the approximately 17.2% of corporate stock which was held in 1973 by pensions and insurance companies. Taxation on savings through these channels is virtually nonexistant, but the model already treats this tax break as part of a 30% savings exclusion from the PIT, since approximately 30% of household savings in 1973 occurred through these vehicles. To avoid doubly crediting this tax break, 17.2% of retained earnings must be treated here as being fully taxable. Then

$$g_{RE_i} = \text{PINCL} \cdot (\text{deferral}) \cdot \frac{(\pi \cdot ASSET_i + RE_i) \cdot (.828) + .172}{RE_i}$$

$$= .207(ASSET_i/RE_i) + .379. \qquad (8)$$

Note that unlike the other g proportions, g_{RE_i} varies by industry. Figures concerning insurance company and pensions' holdings are available in Flow of Funds data. The $ASSET_i$ figures are obtained from 1976 Survey of Current Business data in the following manner. Estimates of corporate net rents and net interest paid are added to figures giving corporate profits after tax with inventory valuation adjustment (IVA) and capital consumption adjustment (CCA). Corporate net rents and net interest shares of total rents and interest paid are assumed to equal the ratio of corporate profits after tax with IVA + CCA over the sum of those profits and noncorporate capital income. The resulting vector of income to corporate assets is then scaled up to equal $732 billion, the asset value of individuals' corporate equity holdings in 1973. The $ASSET_i$ values thus equal the value of corporate capital owned by households and used in the i^{th} industry.

Having described the manner in which the model derives capital tax rates, we proceed to consider the changes incorporated in order to capture the goals of the six tax reforms. The proposal to raise pension maxima is treated as an increase in the savings exclusion from 30 to 40%.

The plan to increase the interest exclusion is also straightforward. Flow of Funds data on assets and liabilities suggest that the gross lending by households is $793.2 billion, while lending by pensions and insurance companies is $323.7 billion, or 29% of the combined value. Insurance and pension income is lightly taxed but this exclusion is treated elsewhere. Therefore interest excludability should only pertain to the sum directly paid to individuals. We use gross rather than net household assets to determine our weights, on the grounds that P2 does not affect the ability of individuals to deduct interest payments from their taxes. Letting PINTINCL denote the percentage of interest income fully taxable at personal rates, we have

$$g_I = \text{PINTINCL}\cdot(.71) + .29 \quad . \tag{9}$$

The impact of the excludability proposal, P2, is to reduce PINTINCL from 1 to .3, or g_I from 1 to one half.

The next three proposals involve only single parameter changes. The plan to remove the $100 dividend deduction but to allow a 60% dividends exclusion from the personal tax base starts with the assumption that the percentage distribution of total dividend income accruing to nontaxable insurance companies and pensions equals their share in equity holdings, the aforementioned 17.2%. Referring to the percentage of dividends includable in the PIT base as PDIVINCL, g_{DIV} may be written as

$$g_{DIV} = \text{PDIVINCL}\cdot(.828) + .172. \qquad (10)$$

The model equivalent form of P3 is to change PDIVINCL from .9444 to .389, or g_{DIV} from .96 to one half.

The proposal to increase the capital gains exclusion, P4, is modelled in a like manner. The term PINCL in equation (8) is reduced from .5 to .3 to capture the reduction in capital gains includability from 50% in 1973 to Senator Long's suggested 30%.

The P5 proposal set forth as an alternative to Senator Long's proposal would index capital gains by removing the capital gains tax on purely nominal appreciation in stock values. This is achieved in the model by setting π equal to zero in equation (8).

The final, comprehensive indexing package involves several substantive changes. As with P5, capital gains indexing is achieved by setting π in equation (8) to zero. Indexing of depreciations is achieved in the following manner. We start with the assumption that the indexing scheme will permit a reduction in the tax liability of the i^{th} industry by an amount equal to

$$\text{DEDUCTION}_i = ((1 + \pi)^{\ell} - 1)\cdot\text{DEPR}_i\cdot\text{CTR}_i \;. \qquad (11)$$

Inflation is assumed to be a constant 7%, and ℓ represents the mean length of time from an asset's purchase to its declaration for the depreciation allowance. We conservatively take this figure to be three years for all industries, so that .225043 is used for $(1+\pi)^{\ell} - 1$. It should be stressed that the results are highly sensitive to the values chosen for ℓ. Moreover, one would ordinarily anticipate a change in financial policies to accompany changes in the tax treatment of depreciation: ℓ should change with the removal of discrimination against long-lived assets. Our model does not capture this additional efficiency gain.

The new capital tax, NCT_i, equals the old capital tax, OCT_i less $DEDUCTION_i$. Consequently, the new capital tax rate can be obtained by dividing NCT_i by KN_i,

$$CTR_i = \frac{NCT_i}{KN_i} = \frac{OCT_i - 0.225043 \cdot DEPR_i \cdot CTR_i}{KN_i} , \tag{12}$$

and solving for CTR_i yields:

$$CTR_i = \frac{OCT_i}{(KN_i + DEPR_i \cdot 0.225043)} . \tag{13}$$

The figures for $DEPR_i$ are found by aggregating and adding corporate capital consumption allowance data for 1973 obtained from the July, 1976 SCB to unpublished estimates of noncorporate depreciation obtained from the Commerce Department.

The third element in comprehensive indexing involves the removal of part of taxable interest income from the PIT base and elimination of part of the individual and corporate deduction for interest payments. SCB figures suggest a 1973 inflation rate of roughly 7% and prime interest rate of slightly more than 8%. Assuming the average loan was at 9%, a real interest rate of 2% emerges. Since 7/9 of interest income was only nominal, we reduce the value of PINTINCL from 1 to 2/9 in the equation:

$$g_I = \text{PINTINCL}\cdot(.262) + (.738) \quad . \qquad (14)$$

The removal of 7/9 of the deductions claimed on household interest payments as well means that only household net interest-bearing assets, some $114.9 million, should enter the weighting scheme. This lowers the weight on PINTINCL to .262 (compared to P2 in which gross interest-bearing assets entered the weighting scheme). The impact of this measure is not great, since most net interest income accrues to pensions and insurance companies, which are already favored. The value of g_I only falls from 1 to .942.

Since it is not the intention of indexing to allow both interest payments and interest receipts to be deducted, corporate interest deductability is decreased to 2/9 of total interest payments. Individuals and corporations are thus allowed only a real deduction invariant with the inflation rate. In principle, 7/9 of interest deductability for noncorporate enterprises should also be removed. We felt, however, that this would be a highly impractical proposal. Much unincorporated business, particularly in agriculture, has a high ratio of interest payments to gross income. A reduction in their interest deductability could imply tax liability in excess of cash receipts since gain occurs as a lower real value of debt. Without significant institutional changes, it is unclear that this could be accommodated without severe disruption. It is also most unlikely that the Congress would consider such a reduction in the first place. We therefore limited our reduction in deductible interest payments to the household and corporate sectors. In addition to changing the weights in (14), this action has the effect of increasing corporate taxes in industry by the .48 marginal corporate tax rate in 1973 times the percent of interest no longer deductible, 7/9, times corporate interest payments in industry i, $CINT_i$. Additional corporate income tax payments in the i^{th} industry, $NCIT_i$, are then

$$NCIT_i = (7/9)\cdot 0.48\cdot CINT_i. \tag{15}$$

The $CINT_i$ figures used are for net corporate interest paid, taken from unpublished data for 1973 allowed us by the National Income Division of the Commerce Department.

The general equilibrium model we use clearly allows the effective modelling of a great number of policies, in manners similar to the adaptations for the six proposals outlined above. A limited drawback is that financial policies remain unchanged. However, any guess or prediction based on a model of the U. S. financial sector can easily be incorporated by simply altering the sizes of various flows in the TMOD routine.

Footnotes

1 The expanded income stream also includes an evaluation of leisure equal to the present value of the net-of-tax wage times leisure hours enjoyed over time.

2 See Boskin (1978) and Summers (1978). Boskin also reaffirms that saving is a positive function of net-of-tax real income.

3 For expositional convenience, we refer to a tax system in which taxes are homogeneous of degree one in prices as "inflation neutral" or "indexed." That is, an indexed system is one in which nominal but not real variables are affected by the inflation rate.

4 The modelling of all six plans is specified in more detail in the appendix.

5 Our notion of potency or cost effectiveness is shown in Table 2. It is the change in present value of real income caused by the reformed sequence of equilibria, divided by the first year's revenue shortfall induced by the change

6 We consider dividend deduction from the personal income tax rather than from the corporate income tax for purposes of allowing greater comparability with the plans to permit interest income and capital gains exclusions from the personal income tax.

7 The tax rates and deductions are all based on our 1973 data and tax laws. Our comparisons are all based on changes to the 1973 economy and the following dynamic sequence based from the 1973 economy, which had a $100 dividend exclusion.

8 In our model, individuals all have the same utility functional form. Data consistency requirements imply differences in some parameters; exogenously chosen ones are assumed identical across individuals. Each CES form has constant marginal utility of income, though these values may differ by class since parameters differ.

9 True inflation neutrality would be difficult, if not impossible to achieve. Individuals and firms alter financial practices in manners that prevent any practical proposal from achieving inflation neutrality. Any change to capital tax rates such as the indexation of all capital income could thus cause capricious capital gains and losses, following the adage that an old tax is a good tax. Proposals for indexation and their shortcomings are discussed in Brinner (1973) and Folsom (1978).

Footnotes, Cont'd.

10
More detailed descriptions of the model can be found in Fullerton (1980b) or in Fullerton, et al., (1978, 1980a, 1980b).

11
A detailed presentation of the procedures is supplied in Fullerton, Shoven, and Whalley, (1978).

12
See Fullerton, et al., (1980a), pp. 21,24.

13
Extensions to allow government debt are currently being considered along with numerous other extensions and applications of the model.

14
Plan 3 (60% dividend exclusion from the PIT) does relatively well here because of its role as a partial corporate and personal tax integration scheme. We recognize that there may be more advantageous tax integration proposals, such as dividend gross-up and credit or dividend deduction from the corporate tax base. These proposals are discussed in Fullerton, et al., (1980a, 1980b).

15
See Fullerton, et al., (1980b).

16
That P2's intertemporal effects exceed P4's can be seen from Table 4: since both P2 and P4 only affect the proportions of capital income taxable by the PIT, the "f_i"s, and $\bar{f}$, the greater reduction in $\bar{f}$ by P2 indicates that it lowers capital taxes and hence intertemporal distortion more than does P4.

17
See Fullerton, et al., (1980b).

18
Special thanks must go to Harvey Galper of the Treasury Department for first suggesting the industrial discrimination of the personal income tax, and to John Shoven of Stanford University for most of the ideas in modelling it. These features of the model were used in other papers by Fullerton, King, Shoven and Whalley.

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