September, 1981

Corporate Tax Integration in the United States: A General Equilibrium Approach

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Corporate Tax Integration in the United States: A General Equilibrium Approach

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This paper presents estimates of static and dynamic general equilibrium resource allocation effects for four alternative plans for corporate and personal income tax integration in the United States. 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.

Results indicate that total integration of personal and corporate taxes would yield an annual static efficiency gain of around $6 billion (1973 dollars). Partial integration plans yield less. Dynamic effects are larger, and our analysis indicates that full integration may yield gains whose present value is as large as $500 billion or about 1.0 percent of the discounted present value of the *GNP* stream to the *U.S.* economy after correction for population growth. 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 is sensitive to the choice of the replacement tax, while static gains are reasonably robust.

I. The Taxation of Corporate Income

A corporate tax which operates separately from the personal income tax is widely acknowledged to lead to a number of problems. It creates a "double" taxation of corporate income. Dividends are paid out of net of corporate tax profits and are further taxed under the personal income tax. Retained earnings, to the extent they are capitalized in higher share values, are also taxed twice, although only fractionally and on a deferred basis by the personal income tax. This double taxation may reduce overall rates of return and adversely affect capital accumulation. A second problem is often referred to as the "lock-in" effect. The efficiency of capital markets is impaired due to the deferral advantage given to retained earnings; firms can reinvest retained earnings in projects with a low yield and their shareholders can still earn a higher net of tax return than if the funds were distributed as dividends and reinvested elsewhere. Thirdly, since only equity returns are subject to corporate taxes, there is a bias towards debt finance, potentially distorting corporate financial policies. Finally, the corporate tax introduces higher effective tax rates in some industries than others, due to special provisions in the corporate tax law and to the varying degrees to which industries are incorporated. These tax rate differentials further disrupt an efficient allocation of capital.[1] Integration plans seek to remove or mitigate these features by linking personal income tax liabilities of stockholders (either on dividends or on all earnings) to the corporate tax liabilities of the firms.

*Princeton University, Federal Home Loan Bank Board, Stanford University and National Bureau of Economic Research, and University of Western Ontario, respectively. We are grateful for financial support from the Office of Tax Analysis, U.S. Treasury Department. Development of the theoretical model structure has been supported through NSF grant no. SOC-78-07417. This paper has benefited from comments by George Borts, Peter Diamond, Harvey Galper, Robert Haveman, Jon Kesselman, Nicholas Kiefer, Hudson Milner, Franco Modigliani, and an anonymous referee. We also wish to acknowledge excellent research assistance from Charles Ballard and Charles Becker.

[1]The competitive model implies net of tax rates of return on capital are equalized across industry. In a situation where capital tax rates vary by industry, this equalization requires that the gross marginal productivity of capital differ among the industries. The efficiency gain accomplished by reducing the differential capital tax rates is due to the reallocation of capital towards industries where it is more productive.

A variety of plans have been proposed over the years, but these typically move only part way to a full integration of personal and corporate taxation. The common objective of all these tax integration plans is to improve the efficiency of the economy through beneficial resource reallocation, in both a static and a dynamic sense. In this paper, four corporate tax integration alternatives are considered. The plans differ in the extent to which they remove the undesirable features of the present corporate income tax.

Plan 1: *Total Integration*: Under this alternative, the corporate income tax is eliminated, and the personal income tax is modified to tax total shareholder earnings, rather than just dividends. When capital gains are realized, the tax basis is set at the original purchase price plus the retained earnings accumulated during the holding period. This feature avoids a double tax on retained earnings capitalized in higher stock prices. However, if the basis is not reset for inflation, the base for capital gains tax will include pure nominal appreciation. This amounts to a capital wealth levy. We evaluate this partnership integration plan with and without inflation indexation of capital gains. These total integration plans are the most comprehensive we consider. They contain modifications to the income tax which, if they had originally been made, would have dispensed with the need for a separate corporate tax. Industrial distortions through the corporate tax are removed, as is the corporate tax distortion of intertemporal consumption choice.

Plan 2: *Dividend Deduction from Corporate Income Tax Base*: This approach simply removes the "double" taxation of dividends by making them deductible from taxable corporate income. Capital gains taxation of individuals is unaltered, and the corporate income tax is effectively converted into a tax on retained earnings only. If current differences in retention policies by industry remain, then some industrial discrimination would continue within the corporate tax.

Plan 3: *Dividend Deduction from Personal Income Tax Base*: An alternative way of removing double taxation of dividends is to allow a dividend deduction from the personal income tax rather than from the corporate income tax. Capital gains taxation is again unaltered. Under this plan, all corporate earnings are taxed at the corporate tax rate, and none are taxed at the personal income tax rate. As with Plan 2, under different retention policies by industry, some industrial discrimination will remain under the corporate tax.

Plan 4: *Dividend "Gross Up"*: This was the plan most actively discussed in the *U.S.* tax reform debate during 1977. It seeks to reduce rather than remove the double taxation of dividends. Part of the income tax paid by corporations is given as an income tax credit to stockholders when dividends are distributed.[2] The credit is taxable, hence the description gross up. Because of the partial nature of the credit, none of the distortions listed above can be wholly removed.

II. A General Equilibrium Model of the U.S. Economy and Tax System

The implementation of an integration plan results in changes in all relative prices in the economy due to the realignment of industry tax rates; both short- and long-run equilibrium quantities will also change. Intertemporal decisions will be reevaluated with a changed rate of return to capital, and the division of time between labor and leisure will be altered. The relative positions of groups within the household sector will change, and therefore a complete evaluation of integration plans should incorporate the interacting nature of the efficiency and distributional effects involved. While a new post-integration tax system may involve uniform tax rates and may be easy to evaluate, the existing tax system is nonuniform. Implementation of any corporate tax integration plan will result in a new set of effective tax rates on capital income by industry and on personal income by consumer groups, and all equilibrium prices and quantities can be expected to vary; the direct effects intended from an integration plan can be offset or

[2]A 15 percent credit was often mentioned and is modeled here. A further possibility discussed was that differential credits might be given depending on the industry in which a company operates; this is not modelled.

TABLE 1—CLASSIFICATION OF INDUSTRIES, CONSUMER EXPENDITURES, AND CONSUMER GROUPS IN THE MODEL

Industries	Consumer Expenditures
1. Agriculture, Forestry, and Fisheries	1. Food
2. Mining	2. Alcoholic Beverages
3. Crude Petroleum and Gas	3. Tobacco
4. Contract Construction	4. Utilities
5. Food and Tobacco	5. Housing
6. Textiles, Apparel, Leather Products	6. Furnishings
7. Paper and Printing	7. Appliances
8. Petroleum Refining	8. Clothing and Jewelry
9. Chemicals and Rubber	9. Transportation
10. Lumber, Furniture, Stone	10. Motor Vehicles, Tires, and Auto Repair
11. Metals, Machinery, Miscellaneous Manufacturing	11. Services
12. Transportation Equipment	12. Financial Services
13. Motor Vehicles	13. Reading, Recreation, misc.
14. Transportation, Communications, and Utilities	14. Nondurable-Nonfood Household Items
15. Trade	15. Gasoline and Other Fuels
16. Finance and Insurance	16. Savings
17. Real Estate	
18. Services	
19. Government Enterprise	

Consumer Groups
(Households classified by $thousands of 1973 gross income)

1. 0-3	5. 6-7	9. 12-15
2. 3-4	6. 7-8	10. 15-20
3. 4-5	7. 8-10	11. 20-25
4. 5-6	8. 10-12	12. 25+

reinforced by induced changes in economic behavior.

Because these induced effects are multiple, nonmarginal, and interlinking, general equilibrium analysis is a natural technique to use in evaluating the combination of distributional and efficiency changes. A medium-size general equilibrium model of the *U.S* economy and tax system, estimated using 1973 data, is used to analyze the four corporate and personal income tax integration plans. It combines a treatment of the *U.S.* tax system with competitive consumer and producer behavior. Equilibrium prices and quantities are determined under each integration plan, and the effects of alternative taxation regimes are evaluated. The model is capable of analyzing the impacts of many different tax proposals concerning not only corporate taxes, but also income, Social Security, sales, property, and other taxes. It incorporates a labor-leisure choice, savings and investment, foreign trade, and government purchase policies. The full range of taxes currently operating in the United States is incorporated into the model. Both single period and multiperiod behavior can be considered. In dynamic analyses, a sequence of single period equilibria is computed, with capital stocks and labor supply changing over time. A labor force growth rate of approximately 2.75 percent per year in efficiency units is used. The precise number is chosen so as to guarantee that the *U.S.* economy is on an assumed balanced growth path in terms of the 1973 data we use. Savings decisions in each period are based on myopic expectations on the rate of return to capital; only in a steady state are these expectations correct.

Nineteen producer good industries, sixteen consumer expenditure items, and twelve consumer types classified by income range are identified and shown in Table 1. These dimensions are governed by a tradeoff between model complexity, data availability, and computational expense. Capital and labor services are the primary factor inputs used by industry, and these are owned by consumer groups in different proportions. These two factors are mobile between industries, and their use is dictated by the zero-profit conditions of perfectly competitive markets.[3] Over time the capital service endowment can grow through investment, and the labor service endowment changes through labor force growth. A labor-leisure choice for households also enters the model. More details on the structure and specification of the model and its data are given in our 1979 article.

A. *Data Sources and Procedures*

The model requires the assembly of a comprehensive and consistent micro-economic data set. Such a data set has not been constructed before for the United States, but is essential for general equilibrium analysis of taxation policy.[4] This data set provides information on factor use by industry (and taxes paid for these), intermediate use of products, outputs of both producer and consumer goods, purchases of consumer goods by household types, incomes by source and by household type, income taxes paid, and several other items such as business investment and foreign trade. The complete 1973 data set used to calibrate the model is derived from five major sources. These include the July 1976 *Survey of Current Business*, unpublished worksheets of the U.S. Commerce Department's National Income Division, the Commerce Department's Bureau of Economic Analysis Input/Output tables, the U.S. Labor Department's 1973 Consumer Expenditure Survey, and the U.S. Treasury Department's merged tax file.

Inconsistencies between these data sets and general equilibrium conditions are resolved using systematic adjustment procedures described in Fullerton, Shoven, and Whalley. Effective tax rates and parameters for equations in the model are estimated from the benchmark equilibrium data set so as to replicate the consistent 1973 data base. Economic effects of each tax policy proposal are then estimated by changing the tax rates and recalculating a simulated equilibrium.

B. *Production*

Each industry produces a single producer good from a combination of capital services, labor services, and the outputs of other industries. Factor-input decisions are assumed to be made on the basis of cost minimization, and these decisions are affected by the tax system since taxes alter the relative producer prices of inputs for each industry.

The use of primary factors by each industry is described by a separate Constant Elasticity of Substitution (*CES*) or Cobb-Douglas production function. The model embodies a capability for preselection of functional form in addition to selection of parameter values. The intermediate use of products by industries is described by a conventional fixed coefficient input-output matrix. This matrix is derived from published 1970 input-output data for the United States and updated to 1973. No substitution between primary factors and intermediate inputs is permitted.

A number of "legal" taxation instruments are treated as production taxes and directly affect costs of industries. The corporate income tax, corporate franchise tax, and the property tax are in combination treated as *ad valorem* taxes on the use of capital services. The Social Security tax, unemployment insurance taxes, and public workmen's compensation taxes are treated as *ad valorem* taxes on the use of labor services. It is, of course, debatable whether these treatments are appropriate. Some recent literature argues for treating the Social Security tax as a benefit-related contribution and for treating the corporate income tax as a lump sum tax or as a tax on the use of equity instruments.

[3]Future extensions of this approach could disaggregate labor into skill types since these might have different rates of substitution for capital. Similarly, capital could eventually be broken down into land, equipment and structures, or some other useful definitions.

[4]Earlier data sets of this type for the United Kingdom have been used by Whalley, and by Piggott and Whalley.

TABLE 2—U.S. TAXES AND THEIR TREATMENT IN THE MODEL

	Tax	Treatment in the Model	Difficulties of Model Treatment
1.	Corporate taxes (including state and local) and corporate franchise taxes	*Ad valorem* tax on use of capital services by industry	Some argue for treatment as a lump sum tax; model treatment ignores role of financial instruments
2.	Property taxes	*Ad valorem* tax on use of capital services by industry	Differential rates across jurisdictions ignored
3.	Social Security taxes, Unemployment Insurance and Workman's Compensation	*Ad valorem* tax on use of labor services by industry	Benefit-related nature of contributions; arbitrary distinction between public and private insurance programs
4.	Motor vehicles tax	*Ad valorem* tax on use of motor vehicles by producers	In practice, a yearly registration fee and not a purchase tax; averaging over jurisdictions
5.	Retail sales tax	*Ad valorem* taxes on purchase of consumer goods	Averaging of rates over states
6.	Excise taxes	*Ad valorem* taxes on output of producer goods	Taxes often expressed as charge per unit physical measure such as volume
7.	Other indirect business taxes and nontax payments to government	*Ad valorem* tax on output of producer goods	Payments depend on output levels by industry to only limited extent; averaging of rates over states
8.	Personal income taxes (including state and local)	Linear function for each consumer where tax on capital affects industry allocation	Detailed deductions and exemptions not specifically considered in model

Our model abstracts from these controversies, but we are aware of them.

In addition to taxes on the use of primary factors, the model includes taxes on the intermediate use of producer goods by industry and taxes on outputs of producer goods. Intermediate input taxes include the registration fees paid on motor vehicles for business use; producer output taxes include the federal manufacturers' excise taxes, paid on purchases for intermediate or final use. Table 2 describes the detailed treatment of all these taxes along with an outline of the entire *U.S.* tax system.

C. *Consumption*

Within the personal sector, twelve consumer groups are identified by their family gross of tax income as reported in the 1973 Consumer Expenditure Survey data published by the U.S. Department of Labor. The number of groups is restricted in order to keep the model of manageable size, but other consumer groupings could be considered. Additional characteristics, such as family size, age, marital status of household heads, and regional location could be examined, as done by J. R. Piggott and Whalley in their model of the *U.K.* tax system.

The income of each consumer group in any period is determined by the ownership of labor and capital services and receipt of transfer income, such as Social Security payments, from the government. Demands for the consumer goods, savings, and leisure are assumed to be generated by utility maximization subject to the household budget constraint.

The nested utility function is given by

$$(1) \qquad U\left(H\left(\prod_{i=1}^{15} X_i^{\lambda_i}, L\right), C_f\right)$$

where H is a CES function determining the allocation of current expenditures between consumption goods X_i and leisure L, while the purchase decisions on the X_i are determined by a Cobb-Douglas subutility function as shown. The elasticity of labor supply with respect to the real after tax wage is set at +0.15 (see H. Gregg Lewis). U is another *CES* function, determining the allocation of income between those current expenditures and expected future consumption C_f. The demand for C_f results in a derived demand for savings, where the elasticity of savings with respect to the real net-of-tax rate of return is taken as .4, consistent with the recent estimates by Michael Boskin.

Demands for the nineteen producer goods are derived from the demands for the sixteen consumer expenditure items using a "Z" transition matrix. An element z_{ij} of this matrix is the amount of producer good i needed to produce one unit of consumer expenditure item j. The distinction we make between producer and consumer goods enables us to simultaneously use national accounts data on a producer good classification and the recently released 1972–73 Consumer Expenditure Survey defined for consumer goods. The Z transition matrix solves the problem of distinguishing consumer demands for outputs of the trade and transportation industries from the demands for goods purchased at retail. Each consumer good requires some trade and transportation for its production. It also solves the problem of rare consumer purchases of goods such as "mining" output.

The sixteenth consumer expenditure item is savings, and the Z matrix permits us to treat it like other goods. We assume that the demand for savings depends upon the current rate of return on capital, given by the current price of capital services relative to the purchase price of new capital goods.[5] We thus assume myopic expectations in the sense that the current rental and purchase price of capital is expected to prevail in all future periods. Actual patterns of investment good purchases are the basis for constructing the column of the transition matrix which converts the consumer's demand for savings into demands for producer goods. This treatment assumes an equality between savings and investment. Savings of one period result in an equiproportional increase in the capital service endowment of households, where the conversion between net investment and capital service units uses a real net-of-tax rate of return of 4 percent.

Progressive personal income taxes are incorporated by a sequence of linear tax functions, one for each consumer. With an intercept that is usually negative and a marginal tax rate applied to all income, we can replicate observed 1973 tax payments and still subject income changes to the appropriate marginal rate. State and local income taxes are modelled as "piggyback" or percentage surcharge taxes applied to the federal levy.

Treatment of personal income taxes is complicated by the need to recognize the preferential treatment of certain types of capital income. Corporate retained earnings which are converted to capital gains have a lower present value tax liability than do earnings paid as dividends. Similarly, the extent to which capital earnings are sheltered by the unincorporated Investment Tax Credit will differ by industry. Thus, the effective personal income tax rate on capital income will differ by industry. Later we discuss the procedure used to introduce these preferential tax rates on some personal capital income, and we discuss their treatment in our modeling of the integration plans.

Government purchases are derived from a Cobb-Douglas demand function defined over producer goods. Government real expenditures are assumed to equal tax receipts less transfers since the general equilibrium approach requires that the government budget must be balanced. The foreign trade sector receives a simple treatment in order to close the model. By assuming that the net value of exports less imports for each producer good remains constant, we can calculate the net quantity transactions at any given vector of

[5] In order to capture the tax exempt nature of saving through pensions, Keogh plans, Individual Retirement Accounts, and life insurance, we model a 30 percent savings subsidy within the income tax framework. This proportion reflects data from *Flow of Funds* accounts. Another 20 percent of savings through owner occupied housing is also taxed on an expenditure tax basis, indicating that the United States is approximately halfway between income and expenditure taxation. Housing tax preferences are also captured by the model as discussed below.

producer prices and transform domestic demands to market demands.

III. Corporate Financial Policies and the Lock-In Effect

There are two important aspects of corporate tax integration which our model does not directly consider, although we have made some efforts to examine the sensitivity of our findings to alternative assumptions on these issues. One problem is the role of corporate financial policies and the other is the so-called lock-in effect.

In recent years a number of authors (Joseph Stiglitz, 1973, 1976; Mervyn King) have emphasized a view of the corporate tax as a differential tax on the various financial instruments available for transferring capital income from firms to individuals. Under this view, there are three different instruments through which capital income of corporations can be "paid" to the owners of capital: interest payments, dividends, and retentions which are assumed to be converted into capital gains. Each of these instruments has tax and nontax advantages and disadvantages that govern its relative use by industry. The firm which uses debt finance can deduct interest from its corporate tax base. This tax advantage is counteracted by the disadvantage that a heavily debt-financed company has a higher probability of bankruptcy and/or takeover. Equity financing cannot avoid corporate taxation, but may result in a large reduction in personal taxes if earnings are retained. Alternatively, though they have no tax advantage, dividends may be paid for a variety of other reasons.

For the purposes of the present paper, the important point is that with changes in tax law, firms can be expected to modify their financial policies. For example, if Plan 2 (dividend deduction from the corporate tax) encourages firms to pay out all earnings in dividends, then Plan 1 (total integration) and Plan 2 are identical in their effects.

We lack good estimates of financial policy elasticity parameters. Therefore, we examine various extreme behavioral reactions and calculate the effects of the tax change, given the assumptions involved. We thus cannot claim a "true" general equilibrium treatment of corporate financial policies since adjustments are made to the dividend/retention ratio to estimate model equivalent tax rates before we make our general equilibrium calculation.

With the lock-in effect, the issue is that the deferral advantage under the existing personal and corporate tax structure gives a tax preference to retention by existing firms. New firms entering financial markets must borrow at higher interest rates than those at which existing firms can implicitly borrow through retentions. Thus, if existing firms are slower growing and less efficient, the proper reallocation of resources to new firms may not take place.

Since we consider a general equilibrium model with constant returns to scale technology, we do not incorporate an explicit theory of individual firm behavior, and a reallocation of capital between firms within an industry does not affect the industry production function. We are therefore unable to incorporate efficiency aspects of the lock-in effect.

The resource allocation effects of corporate and personal tax integration we consider are restricted to interindustry and intertemporal distortions. Interindustry distortions enter through differential capital income tax rates by industry, and intertemporal distortions affect savings behavior in the economy and change capital allocation over time.

IV. Representing the Tax Integration Plans in Model Equivalent Form

Each of the tax integration plans described in Section I is represented in model equivalent form for the purposes of analyzing its general equilibrium impacts. For each plan we calculate a new set of appropriate effective tax rates and use these to compute a simulated equilibrium. We compare the new simulated equilibrium with the data generated by the model under a situation of no policy change.

We first calculate each industry's capital income net of corporate income tax, corporate franchise tax, and property tax. For each of the twelve consumer classes, data on marginal tax rates (τ_j) are obtained from the Treasury Department's merged tax file. A weighted average marginal tax rate (τ) is calculated.

For each type of capital income, we define a single parameter g which reflects the proportion of that type of capital income which is fully taxed under the personal income tax. Interest and monetary rent are fully taxed by the personal income tax, so the g_I for interest and the g_{MR} for monetary rent are set to one. For the housing industry, imputed rent from owner-occupied homes is not taxable and has a g_{IR} of zero. For dividends in 1973, the government's revenue loss due to the \$100 dividend exclusion from the personal income tax was estimated at \$285 million.[6] We divide this by τ to get an estimate of nontaxable dividends, \$1164 million. Since total dividends paid is \$24,631 million, the proportion taxable is 0.96 and this figure is used as the g applied to dividends, g_D.

In the case of capital gains, Martin Bailey has shown that close to one-half of long-term capital gains are realized in a relatively short period, while the remainder is held for lengthier periods, averaging perhaps 35 years or more. Weighing the advantages of exclusion and deferral in light of these observations on holding periods leads to a conclusion that about 25 percent of nominal capital gains are effectively included in the base of the personal income tax. Accounting for 1973 inflation, however, we calculate that 73 percent of real capital gains in 1973 were fully taxed at the personal level, implying .73 as our g for retained earnings, g_{RE}.

The noncorporate investment tax credit ($NCITC$) also reduces the proportion g_{NC} of noncorporate capital income (NCI) which is effectively fully taxed by the personal income tax. For each industry, it is the dollar amount ($NCI - NCITC/\tau$) which is fully taxed at rate τ and yields observed tax payments ($\tau \cdot NCI - NCITC$).

Then, for each of the nineteen industries and government, we use the g proportions to define a fraction f_i, which denotes the proportion of that sector's capital income which is subject to full personal income taxation. The f_i fraction differs across industries for a number of reasons, but primarily because of different dividend and retention policies. In fact, to calculate the f_i, we make use of data on capital income types by industry, examining corporate profits (dividends and retained earnings), net interest payments (monetary and imputed), net rent payments (monetary and imputed), and the return to capital used in noncorporate business. An industry's f_i is the weighted average of the g proportions. Each industry has different weights which are its amounts of the various capital income types.

The average fraction of capital in all industries which is fully taxable by the personal income tax is denoted $\bar{f}$. In addition to the corporate income tax, corporate franchise tax, and property tax, we add another factor tax at the industrial level, termed the personal factor tax. The personal factor tax is collected by industry at rates τf_i. The personal income tax applied to capital income at the consumer level is given by

$$t_j = (\tau_j - \tau) k_j \bar{f} \qquad j = 1, 12 \tag{2}$$

where k_j is the capital income received by the jth consumer class. These consumer income 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 of the capital used, at rate τ. The consumer income taxes in expression (2) 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 corrections sum to zero.

Each of the four integration plans implies a different set of values for f_i and for capital tax rates. Because of the government's balanced budget, however, it is important that it receives the same real tax revenue in the simulated equilibrium. Otherwise, the change in the pattern of government expenditures and transfers would affect the outcome and prevent the isolation of the effects of the

[6] *1976 Tax Expenditures*, U.S. Congress.

capital tax rate changes. Tax rates under each plan are therefore modified during computation until the resulting equilibrium tax yield allows government to make the same real purchases and give the same real transfers to consumer groups. The determination of real purchases and real transfers is based on Laspeyres price indices.[7] Different yield preserving taxes are considered. In dynamic analyses we consider equal yield tax replacements on a period by period basis.

The modifications used in our model to represent each plan are as follows:

Plan 1: *Total Integration*: Under this plan, the undesirable features of the corporate tax are removed by merging the corporate income tax and personal income tax. Corporate taxes are eliminated from the numerator of the new capital tax rate calculation. The personal income tax is changed to tax earnings rather than just dividends, implying a g_{RE} set to one. We calculate new f_i parameters using this new g_{RE}, but with the same capital income weights as before. These changes imply new personal factor taxes and thus new capital tax rates by industry.

Plan 2: *Dividend Deduction from Corporate Tax Base*: This plan's corporate income tax base is the undistributed profits of corporations. It is represented in model equivalent terms for each industry by removing a portion of the corporate tax paid from the 1973 capital taxation figures and recalculating the capital tax rate. The portion of corporate tax removed is given by the ratio of dividends to net of tax corporate profits by industry (*Survey of Current Business*, July 1976). The f_i and the personal income tax functions do not change.

Plan 3: *Dividend Deduction from Personal Income Tax Base*: This plan removes the taxation of dividends from the redistributive power of the income tax system. In model equivalent terms, it is specified by considering the effect of dividend deductibility on the income tax functions of households. The value of the g_D proportion of dividends taxable by the personal income tax is set to zero and all f_i are recalculated. Other adjustments are analogous to the description of Plan 1.

Plan 4: *Dividend "Gross Up"*: This scheme gives stockholders an income tax credit of 15 percent of the corporate taxes paid by the firms in which they own an interest. It is most satisfactorily modelled as a reduction in the corporate taxes of each industry by the amount of the credit. This amount is then treated as additional dividends in the calculation of new f_i values. The new effective tax rates then include 85 percent of corporate income taxes and the new personal factor taxes. The higher dividends relative to retained earnings result in higher f_i and $\bar{f}$ values, so that consumers experience an increase in taxable capital income. The taxable nature of the credits are thus captured.

V. Results

Tables 3 and 4 present static efficiency and distributional results from the integration plans. Table 5 presents our calculation of dynamic effects. To obtain the static measures of efficiency changes displayed in Table 3, we first calculate changes in national income plus leisure, valued at prices before the policy change and after the policy change. We use these Paasche and Laspeyres quantity indices rather than compensating or equivalent variations because the utility contribution of savings may be inaccurately assessed by consumers due to their myopic expectations. Table 3 reports only the geometric mean of these two measures, for each tax replacement. The single period change in the real after-tax income of each of the twelve consumer classes is presented in Table 4.[8]

[7]Operation of the equal yield calculation is discussed in Shoven and Whalley.

[8]Because of the general equilibrium nature of these calculations, both sources and use effects are included in the Table 4 distributional results. Suppose, for example, that the rental price of capital rises in the simulated equilibrium. Low-income consumers tend to purchase outputs of lightly taxed, capital-intensive industries like housing, agriculture, and petroleum. Thus the uses side of income would have some regressive effects. On the sources side, note that the capital-labor ratio of income from our data is bowl shaped over income groups. This

TABLE 3—CHANGE IN REAL EXPANDED NATIONAL INCOME[a] UNDER VARIOUS ASSUMPTIONS
(in billions of 1973 dollars)

Tax Replacement Plan	Lump Sum Scaling[b]	Multiplicative Scaling[b]	Additive Scaling[b]
Plan 1: Full Integration with Indexing	11.135	6.206	6.369
Plan 1: Full Integration without Indexing	9.716	5.833	5.936
Plan 2: Dividend Deduction from Corporate Income Tax[c]	5.061	2.862	3.421
Plan 2: Dividend Deduction from Corporate Income Tax, with Extreme Behavior Assumption[c]	11.408	6.260	6.442
Plan 3: Dividend Deduction from Personal Income Tax[c]	3.840	2.544	2.600
Plan 3: Dividend Deduction from Personal Income Tax, with Extreme Behavior Assumption[c]	5.977	3.301	3.449
Plan 4: Dividend Gross-up	3.668	2.749	2.780
Equal Capital Tax Rates on Industry[d]		8.682	

[a]Real Expanded National Income incorporates the change in the valuation of leisure through induced variations in labor supply. The numbers reported are the geometric means of Paasche and Laspeyres index numbers, for each tax replacement, as described in the text.

[b]Lump sum scaling collects the extra government revenues necessary for equal yield from the twelve consumers in proportion to their original after-tax incomes. Multiplicative scaling collects the extra revenue by increasing the marginal tax rate of each of the twelve consumers by the same multiplicative factor. Additive scaling increases all marginal tax rates by the same absolute amount, as necessary to retain equal tax yield when the policy change alone would reduce revenues.

[c]The standard simulations for dividend deduction plans 2 and 3 assume that corporate financial policies do not change. In particular, the new f_i parameters are calculated with the old levels of dividends and retained earnings as weights for g_D and g_{RE}. However, these dividend deduction plans might encourage greater distribution of corporate profits. The "extreme behavior assumption" uses the sum of dividends and retained earnings as the weight on g_D, with no weight on g_{RE}.

[d]This result is for complete equalization of capital tax rates by industry. The property tax, corporate franchise tax, corporate income tax, and personal factor tax are included in this equalization. This result is presented for comparison purposes.

For the dynamic welfare effects shown in Table 5, we evaluate the instantaneous utility function H from equation (1). We report the sum of present value analogues of compensating variations using these utility functions, smoothing between equilibria to allow for growth rates within each of the separate periods we consider.[9] This measure reflects the amount (in 1973 dollars) which would have to be given to the twelve consumer groups to leave them indifferent between the present tax system and the tax integration plan.

We have calculated but do not report percentage changes in price and in output by industry, for each tax replacement. Other information on new capital and labor use by industry, taxes paid, and all types of demands are also available for each tax replacement.[10] The findings for each of the integration plans are as follows:

Plan 1: *Total Integration*: This plan removes only part of industrial discrimination in the taxation of capital income because property taxes remain as differential capital taxes by industry. Intertemporal distortion is

is largely due to their age structure. Since our model calculates a long-run equilibrium, where homogeneous capital is reallocated among industries, the new higher return to capital is earned by all capital owners regardless of their original portfolio. The higher price of capital would cause bowl-shaped gains on the sources side of income.

[9]Since the model calculates a sequence of six equilibria which are ten years apart, significant growth can occur during the intervening years. In any sequence, we calculate the annual growth rate implied by the difference between two successive equilibria, and we apply that growth rate to intervening years in the present value calculations.

[10]This additional information is available from the authors on request.

TABLE 4—PERCENTAGE CHANGES IN EXPANDED REAL INCOME[a] AFTER INCOME TAXES AND TRANSFERS BY INCOME CLASS, FOR EACH TAX REPLACEMENT

Consumer Group	Equal Capital Tax Rates on Industry[d]	Plan 1 Full Integration (Additive Scaling)[b]	Plan 1 Full Integration (Multiplicative Scaling)[b]	Plan 2[c] Dividend Deduction from Corporate Income Tax (Multiplicative Scaling)[b]	Plan 2[c] With Extreme Behavior (Multiplicative Scaling)[b]	Plan 3[c] Dividend Deduction from Personal Income Tax (Multiplicative Scaling)[b]	Plan 3[c] With Extreme Behavior (Multiplicative Scaling)[b]	Plan 4 Dividend Gross Up (Multiplicative Scaling)[b]
0–3,000	0.786	1.945	3.471	1.112	3.488	0.215	0.210	0.796
3–4,000	0.650	1.386	2.682	0.951	2.702	0.272	0.346	0.648
4–5,000	0.585	0.928	2.022	0.808	2.040	0.274	0.387	0.524
5–6,000	0.606	0.930	1.926	0.764	1.941	0.284	0.384	0.509
6–7,000	0.704	0.920	1.850	0.736	1.866	0.297	0.426	0.500
7–8,000	0.691	0.786	1.568	0.633	1.580	0.282	0.401	0.446
8–10,000	0.645	0.626	1.222	0.485	1.227	0.250	0.339	0.378
10–12,000	0.731	0.733	1.121	0.377	1.125	0.269	0.354	0.363
12–15,000	0.840	0.747	1.021	0.232	1.024	0.270	0.373	0.350
15–20,000	0.863	0.767	0.672	−0.014	0.670	0.274	0.350	0.283
20–25,000	1.063	1.022	0.654	−0.155	0.659	0.359	0.506	0.293
25,000+	2.240	3.202	1.388	−1.523	1.540	1.791	3.130	0.567

[a]Expanded real income includes leisure, valued at the household net-of-tax rate. Numbers shown are the arithmetic means of percentage changes to income based on Paasche and Laspeyres price indices.
[a,b,c]See fnn. b,c,d; Table 3.
[d]See fnn. b,c,d; Table 3.

substantially reduced. We consider equal yield tax replacements, as described earlier, such that taxes are scaled up to meet tax revenues from the corresponding period of the previous tax regime. We consider lump sum adjustments to income taxes, along with additive and multiplicative scaling of marginal income tax rates.

Interindustry discrimination is reduced enough to provide a $6 billion static welfare gain in each year (in 1973 dollars) for the cases with either multiplicative or additive scaling and inflation indexation of capital gains taxes. Without this price level correction, the efficiency gains are slightly less. Dynamic gains are sensitive to the replacement yield-preserving tax considered. With lump sum replacement, a gain of $551 billion occurs, and with multiplicative scaling a gain of $268 billion occurs. These figures are to be compared with a $49 trillion discounted present value of the future income stream for the *U.S* economy under the present tax system (after correction for population growth, in 1973 dollars). The sensitivity of these dynamic results to the replacement tax can be explained by the positive correlation between income and proportion of income saved. Since multiplicative scaling collects more tax revenue from high-income groups, it creates a greater distortion in their intertemporal choices.

Full corporate tax integration provides progressive gains to income brackets, shown in Table 4, with every class enjoying increased real income.[11] The importance of the structure of the replacement yield-preserving tax is apparent from Table 4. Multiplicative scaling helps lower-income groups substantially more.[12]

We do not need to consider changes in financial policies under this plan. With full integration, all forms of capital income are

[11]Although the simulated equilibrium is a Pareto improvement over the benchmark 1973 equilibrium, we have said nothing about the possible paths between the two. Short-run losses and transition costs should be considered before enacting such a change. Our model is essentially comparative static and does not measure these disequilibria or temporary influences.

[12]The U-shaped gains of the additive replacement can be explained by the higher return to capital in the simulated equilibrium. The capital-labor ratio of income is greatest for the low-income (retired) individuals and again for high-income individuals.

TABLE 5—DYNAMIC WELFARE EFFECTS: PRESENT VALUE OF COMPENSATING VARIATIONS OVER TIME[a]
(In Billions of 1973 Dollars)[e]

Tax Replacement Plan	Lump-Sum Scaling[b]	Multiplicative Scaling[b]	Additive Scaling[b]
Plan 1: Full Integration with Indexing	551.376 (1.126)	267.760 (0.547)	335.608 (0.685)
Plan 1: Full Integration without Indexing	473.786 (0.967)	252.990 (0.517)	305.394 (0.624)
Plan 2: Dividend Deduction from Corporate Income Tax[c]	257.905 (0.527)	154.822 (0.316)	178.697 (0.365)
Plan 2: Dividend Deduction from Corporate Income Tax, with Extreme Behavior Assumption[c]	566.016 (1.156)	269.449 (0.550)	340.575 (0.695)
Plan 3: Dividend Deduction from Personal Income Tax[c]	229.815 (0.469)	151.656 (0.310)	166.003 (0.339)
Plan 3: Dividend Deduction from Personal Income Tax, with Extreme Behavior Assumption[c]	379.228 (0.774)	220.252 (0.450)	256.670 (0.524)
Plan 4: Dividend Gross-up	181.877 (0.371)	127.676 (0.261)	139.965 (0.286)
Equal Capital Tax Rates on Industry[d]		454.546 (0.928)	

[a]To produce these measures, we first calculate a sequence of momentary equilibria through time. Endowments of capital are incremented through savings. Endowments of labor services are incremented through population growth and Harrod neutral technical change. We consider six equilibria which are ten years apart, in order to project annual consumption values over the 50 intervening years. For consumption beyond year 50, we have 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.

[b,c,d]See fnn. b,c,d; Table 3.

[e]The numbers in parentheses represent the gain as a percentage of the present discounted value of welfare (consumption plus leisure) in the base sequence. This value is $49 trillion for all comparisons, and only accounts for a population the size of that in 1973.

taxed identically. Since the tax does not depend on whether capital income is paid in interest, dividends, or retained, a change in either the debt-equity or dividend-retention ratio will not alter the new effective tax rates or the new f_i for the revised equilibrium calculation. The resulting solution would thus be the same even if the ratios changed.

Plan 2: Dividend Deduction from Corporate Income Tax Base: Here dividends are treated like interest for tax purposes, and we first assume that corporations continue to retain the same portion of income. The reduction of the corporate income tax base causes some levelling of capital tax rates and a resulting $3 billion increase in yearly national income. Dynamic gains under multiplicative scaling of tax rates are $155 billion. Under a lump sum replacement, dynamic gains are $258 billion. The reduced spread of dynamic results is due to the smaller revenue loss associated with Plan 2. When the amount of revenue to be replaced is small, the additive or multiplicative replacement schemes do not cause so much distortion of intertemporal choice. The static distributional impacts are disadvantageous to the higher-income groups, reflecting the fact that less income is taxed at the flat corporate rate and more at the progressive personal rates.

Under our "standard" treatment of Plan 2, the dividend-retention ratio is assumed constant even though there does exist an incentive to replace retained earnings with now nontaxed dividends. For this reason, we also consider the extreme case where all corporate earnings are distributed. The corporate income tax would thus be effectively eliminated, and f_i calculations would proceed on the assumption that all corporate earnings get multiplied by the higher .96 for g_D. The static gain for such a tax replacement is around $6 billion per year, the same as under Plan 1; the dynamic gains are also comparable. These welfare gains are substantially above the fixed-behavior estimate because corporate decision makers have, in effect, reduced the distortion of the corporate income tax with its differing effective capital tax rates. The static distributional results of the Plan 2 extreme-behavior case show more progressive gains among consumers.

Plan 3: Dividend Deduction from Personal Income Tax Base: The reduced tax on dividends again implies lower tax rates on heavily incorporated industries and a levelling of all rates in general. This occurs through the lower f_i for dividend paying industries. Static welfare gains are about $2.5 billion per year; dynamic gains under multiplicative scaling are about the same as Plan 2, at $152 billion, but under lump sum replacement are lower than Plan 2, at $230 billion. The multiplicative results reflect the importance of the deduction from the upwardly scaled income tax. As might be expected, Table 4 shows that Plan 3 has more regressive effects than the second plan, since dividend income is all taxed at the corporate rates instead of being taxed at progressive personal tax rates.

Under extreme financial policy behavior, where firms no longer retain earnings, both the static and dynamic gains are somewhat larger. The corporate tax remains the same, but new f_i include all corporate earnings as dividends with a g_D of zero. Less corporate income is subject to the personal income tax. The difference between results with and without the extreme-behavior assumption is less than for Plan 2 because the personal income tax deduction does less to eliminate interindustry discrimination than does the corporate income tax deduction of dividends. Equity effects are regressive for the extreme-behavior case of Plan 3, as with the case in which we assume no change in financial policies.

Plan 4: Dividend "Gross Up": All plans that decrease the corporate income tax only on dividends can be termed partial integration plans. The fourth plan, because it reduces only part of the tax on dividends, might be called a partial-partial plan. The tax system is changed to a lesser degree, and the static welfare gain is small, at $2.8 billion per year. Dynamic gains under multiplicative scaling are $128 billion, under additive scaling are $140 billion, and under a lump sum replacement are $182 billion.[13] Equity effects are closer to proportional than under Plan 1.

We also report, as a basis for comparison, the effects of complete equalization of capital tax rates by industry under an equal government revenue constraint. We report these results even though we realize that complete equalization of capital tax rates is not a realistic policy proposal. In this case, we eliminate tax discrimination on capital use among industries, use a single tax rate for all industries, and tax equally all capital income at the personal income tax level. Capital tax rates are set to a common rate, providing government with enough revenue to maintain its real purchases. The f_i parameters are all reset to f, the overall fraction of capital income which is effectively fully taxed by the personal income tax system. The resulting efficiency gains are larger than those of the four integration plans and represent the maximum possible increase in expanded national income from the elimination of interindustry capital tax distortions.[14]

Results in Table 3 indicate that the efficiency gains from equalizing capital taxes by industry is about $8.7 billion per year in 1973 dollars. Table 4 shows that the gain turns out to be distributed in such a way that every group experiences an increase in real income, and thus a Pareto improvement oc-

[13] Here, again, the spread between the dynamic welfare gains is less than that of full integration because this plan involves smaller revenue loss than full integration. Multiplicative scaling makes up most revenue from high-income, high-saving consumers, and it thus reduces future capital stocks and incomes. The dynamic lump sum and additive cases show that the dividend gross-up does substantially less to improve interindustry resource allocation than other plans.

[14] The capital tax equalization removes all interindustry distortions, but it leaves intertemporal distortions because the common capital tax rate is scaled to preserve total tax revenue. The full integration with lump sum replacement, described above, has larger efficiency gains in both Tables 3 and 5 because it removes some interindustry distortions and some intertemporal distortions.

curs. Dynamic gains in this case (Table 5) are \$455 billion, which is about 0.9 percent of the discounted present value of the future *U.S.* income stream after correction for population growth.

Perhaps the most interesting of our results for the integration plans are the dynamic results which suggest significant potential gains from corporate tax integration, provided replacement taxes do not excessively interfere with intertemporal consumption choice. There appears to be a tradeoff between achieving progressive or proportional income gains through multiplicative scaling and maximizing the dynamic efficiency gain: the largest intertemporal gain could be secured by taxing the poor who do not save.

VI. Conclusion

In this paper we have analyzed four alternative plans for corporate and personal income tax integration in the United States, by using a recently constructed medium-scale general equilibrium model of the *U.S.* economy and tax system. The paper includes a brief discussion of the model and its use of data, in addition to outlining characteristics of the integration plans and their representation in model equivalent form.

Total integration of personal and corporate income taxes is shown to yield static efficiency gains of \$6 billion per year using 1973 data, and the present value dynamic gains range from \$253 billion to \$551 billion in 1973 prices, depending on the yield preserving tax. Dividend deductibility from either the corporate income tax or the personal income tax results in a static efficiency increase of slightly less than half of the gains from full integration. A 15 percent dividend gross-up scheme yields somewhat less than dividend deduction from the corporate tax but a little more than deduction from the personal income tax. The distributional impacts vary among plans; full integration with multiplicative scaling of marginal income tax rates to preserve tax yields is shown to imply a progressive change in the distribution of real income even though every class is better off. Dividend deductibility from the personal income tax is shown to have a beneficial impact slightly more advantageous to high-income groups, while dividend deductibility from the corporate income tax redistributes from high to low income groups. The dividend gross-up plan is roughly proportional. In the sensitivity of dynamic gains to the yield preserving tax we find an interesting result. It suggests that the potential gains under integration from removal of intertemporal distortions would be significantly reduced if marginal income tax rates are raised, particularly if the higher-income groups, who are also larger savers, face larger tax rate increases.

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