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3 Transfer Elements in the Taxation of Income from Capital

Harvey Galper and Eric Toder

3.1 Introduction

In an earlier paper (Galper and Toder 1981), we developed a model of firm investment behavior and household portfolio behavior to examine the effects of changing the relative supplies of tax-preferred and fully taxed assets on resource allocation and on government revenues. This present paper is an extension of that earlier work. Here, however, our concern is less with allocation than with distributional effects. In particular, we examine the implications of the availability to households of a number of differentially taxed assets for the measurement of tax burdens and transfer benefits. We develop a framework of analysis and an operational model to demonstrate how the tax system affects the before-tax returns earned by savers on different types of financial and real assets. We then show how traditional measures of tax incidence are altered when account is taken of the effects of the tax system on the portfolio decisions of households.

The traditional calculation of tax burdens, or effective tax rates, relates taxes paid to measured income. In contrast, we define what might be called *full* tax burdens or *full* effective tax rates. The full effective tax rate calculation differs from the traditional effective tax rate calculation by explicitly accounting for the effect of the tax structure on the before-tax return on an asset.

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For example, in the case of tax-exempt bonds, the traditional calculation assumes that the before-tax return equals the after-tax return and that, consequently, no tax is paid on the income from the asset—the literal meaning of a tax-exempt security. The full effective tax rate calculation, on the other hand, compares the before-tax return on a tax-exempt asset with the return that would be available to the saver if there were no taxes on any asset. In doing so, this method recognizes that savers bid up the price (bid down the yield) of tax-exempt assets to avoid taxes and that this decline in the before-tax yield constitutes an implicit tax on the holder of the tax-exempt bond.

By similar logic, tax preferences, in causing some households to shift from heavily taxed to lightly taxed assets, not only reduce before-tax returns on the latter but also increase before-tax returns on heavily taxed assets. These increases in before-tax returns can be viewed as implicit transfers to wealth holders in relatively low marginal tax brackets. The total redistributive effects of the tax system must incorporate all taxes and transfers inherent in the combination of a progressive rate structure and preferentially taxed assets. It is entirely appropriate that these transfers, even though of an implicit nature, be recognized in a complete accounting of transfers provided through the public sector.

In this paper, we have developed an analytical model to demonstrate these points. This model is a stylized approximation to the real world designed to illustrate the general nature of the interactions between tax burdens and preferential taxation of various classes of assets rather than to provide definitive quantitative estimates of these tax burdens. In our illustrative model, households choose their portfolio mix to maximize their after-tax returns. On the other side of the market, firms, governments, and households supply tax differentiated assets to finance the acquisition and maintenance of productive physical capital. When household demands for each kind of asset are equilibrated with firm, government, and household supplies, the sectoral allocation of the capital stock, the distribution of asset holdings among households, and before-tax yields on different assets held by households are all simultaneously determined. The rates of return and the distribution of asset holdings determine the relative tax burdens and, as we shall see, transfer benefits by income class resulting from differential taxation by kind of asset. This latter relationship is the main area of investigation in this paper—the translation of tax preferences as applied to specific *categories of assets* to the distribution of tax burdens and transfer benefits by *income class*.

The road map for the remainder of this paper is as follows. Section 3.2 presents algebraically the concept of full effective tax rates incorporating implicit taxes and transfers and contrasts this approach to traditional measures of tax incidence. Section 3.3 discusses the formal model for asset demands and supplies used to estimate implicit taxes and transfers. Section 3.4 then presents model simulations that compare conventional tax burden measures under 1979 law with measures of full effective tax rates. These simulations illustrate how taking account of implicit taxes and transfers increases the measured progressivity of the tax structure. Section 3.5 summarizes the results.

3.2 Tax Burdens and Changes in Before-Tax Returns

It is well known that a full analysis of the incidence of the tax system must take into account not only the taxes actually paid by each income class but also the changes in before-tax income induced by the tax system itself. The problems inherent in accurately specifying before-tax income under alternative tax structures have caused earlier critics of statistical studies of the distributional effects of taxation almost to despair of our ability to produce any meaningful results.[1] This same point has been emphasized more recently by Martin Bailey (1974), who has shown that pre-tax returns on particular real and financial assets are affected by the special tax treatment that may be accorded to those assets. In other words, before-tax returns on those assets cannot be assumed to be invariant with respect to the tax structure itself. Changes in before-tax returns can be regarded as implicit taxes and transfers.

The concept of full effective tax rates incorporating implicit taxes and transfers may be formalized in the following way. We may define the effective tax rate, t_e, on the yield from an asset in terms of its before-tax return, r_b, and its after-tax return, r_a. Thus,

$$t_e = \frac{r_b - r_a}{r_b}. \tag{1}$$

The after-tax return on an asset that is only partially subject to tax may be represented as follows:

$$r'_a = r'_b\,(1 - \alpha t), \tag{2}$$

where r'_a is the after-tax return, α is the portion of the return subject to tax, r'_b is the before-tax return, and t is the taxpayer's tax rate. The conventional measure of the effective tax rate substitutes r'_a and r'_b into equation (1) and derives $t_e = \alpha t$. Thus, if the asset's return were only 40 percent taxed, the effective tax rate by the conventional measure would be 40 percent of the tax rate of the household holding the asset.

In fact, the before-tax return on a preferentially taxed asset will tend to fall below the return that would prevail in the absence of taxes on capital income. This may be represented as

$$r'_b = (1 - \beta)\,\bar{r}_b, \tag{3}$$

where $\bar{r}_b$ is the before-tax return in the absence of all taxes on capital income, and $\beta \leq 1$ is a measure of the decline in the before-tax return on the preferentially taxed asset relative to the return in the absence of taxation of capital income. Substituting equations (2) and (3) into (1), one derives

(4) $$t_e^f = \alpha t\,(1 - \beta) + \beta\,,$$

Where t_e^f is the full effective tax rate when the before-tax return is taken to be $\bar{r}_b$. The first term on the right side of equation (4) is the explicit tax. Its value is exactly the same as the explicit tax, αt, under the conventional measure which is based on r_b' rather than $\bar{r}_b$. The β term by itself is a measure of the implicit tax or the reduction in the before-tax return from holding the tax-preferred asset. The full effective tax rate is composed of both explicit and implicit taxes.

For some assets, of course, the before-tax return as a result of the tax structure may be greater than $\bar{r}_b$ since, as households move to tax-preferred assets, returns on fully taxed assets will be driven up. In terms of equation (3), this implies a value of β of less than 0. Equation (4) would continue to hold, but in this case, the full effective tax rate would be less than the traditional measure. A negative value of β would constitute an implicit *transfer* provided by the tax system, and if β, in absolute terms, is great enough, the effective tax rate may even be negative.

3.2.1 The Traditional Approach to Tax Incidence

The best example of the traditional approach to tax incidence is the now classic Pechman-Okner study of tax burdens for the year 1966.[2] It is the most meticulously done and most thoroughly documented study of its kind. Since our concern is with federal taxes on capital income, we will concentrate on only two of the taxes examined by Pechman-Okner (henceforth P-O)—the personal income tax and the corporation tax.

In the case of the corporate tax, P-O explicitly adjust the before-tax incomes of households to account for the assumed incidence of the tax. Thus, if the corporate tax is assumed to be borne by corporate shareholders, then both the before-tax income of shareholders and the taxes paid by them reflect this. As P-O note, this is the assumption implicit in the treatment of corporate taxes in the national income accounts. If, as an alternative assumption, the corporate tax is taken to fall on all capital income, then taxes and the before-tax income of all recipients of capital income are correspondingly increased. For the corporation income tax, then, before-tax income flows are not invariant but change with the assumed incidence of the tax.[3]

One fairly minor point in their methodology of allocating the corporate tax to all capital income should be noted here. This allocation is based on measured household income before the personal income tax but after the corporate income tax. As they correctly note, "Ideally the allocation should have been based on income shares as they would have been before any taxes were imposed" (Pechman and Okner 1974, p. 96). Thus, to the extent that measured before- (personal) tax capital income for a particular income class differs significantly from what the before-tax income of that class would have been in the absence of all taxes, the allocation of the corporate tax burden in the P-O study is not fully consistent with the assumption that the corporate tax burden falls equally on all capital. However, since in our model the corporate income tax turns out to be quite small, this source of difference between us and P-O is of only minor importance.[4]

In contrast, the treatment of personal income taxes on capital income is of much greater importance. Despite their use of a range of incidence assumptions for other taxes, P-O assume no shifting of the individual income tax (Pechman and Okner 1974, p. 37). This implies that the before-tax capital income of a household is not changed by the tax system itself.[5]

3.2.2 Allocational and Distributional Effects of the Structure of Taxation of Capital Income

The major elements of the structure of capital income taxation at the personal level are a rising schedule of marginal tax rates combined with an array of preferences for particular assets held by households. These preferences include the exemption of interest on state and local bonds; exclusion of the return to owner-occupied housing and other consumer durables combined with the deductibility of interest to finance such assets; accelerated depreciation and the investment tax credit on eligible property held in the form of partnerships and sole proprietorships and thus taxed directly to individuals; capital gains treatment for corporate equities on that portion of the return resulting in appreciation in the value of the stock; and effective tax exemption of income on assets held in pension funds on behalf of individuals. Other more specialized provisions relating to the taxation of capital income for specific industries also exist, but the ones listed above are the most important preferences in the individual income tax.[6]

As pointed out by Bailey (1974), the response of households to this structure of tax provisions gives rise to major allocational and distributional effects. As a result of competition among taxpayers, all of whom are trying to maximize after-tax rates of return, "tax favored activities come to equilibrium at lower pre-tax rates of return than normally taxed activities" (Bailey 1974, p. 1159). Thus, taxpayers in higher marginal tax brackets are willing to sacrifice before-tax returns to hold preferentially taxed assets that provide greater after-tax returns. This sacrifice of before-tax income constitutes the *implicit tax* mentioned above. In addition, the taxable yield itself is increased as a result of the same portfolio shifts by high-bracket savers. The increase in the taxable yield generates implicit transfers, or higher before-tax incomes for those continuing to hold fully taxed assets.

These implicit taxes and transfers give rise to both allocational and distributional effects. The allocational effects result because tax preferences lower the cost of capital in particular sectors of the economy, such as housing and state and local government. The distributional effects result from the equilibrium changes in after-tax incomes once households have adjusted their financial portfolios in response to the tax structure.

The distributional implications of implicit taxes and transfers were discussed in the Treasury Department's 1977 study of broad-based tax reform options and were taken into account in defining before-tax incomes. However, the measurement of implicit taxes and transfers in the Treasury study was not based on an analytical model of household portfolio choice (U.S. Treasury Department 1977).

3.2.3 Related Research

While the effects of implicit taxes and transfers on the distribution of tax burdens by income class have not been specifically modeled, the implications of the structure of taxation of capital income for household portfolio choice and for the allocation of physical capital have been pointed out in a number of studies. Martin Feldstein (1976), using data from a 1962 survey of income and assets undertaken by the Federal Reserve Board, found that households with higher incomes (and consequently in higher marginal tax brackets) tend to hold larger shares of preferentially taxed assets in their portfolios than do lower income households. Similarly, Galper and Zimmerman (1977), using 1972 data generated by the Internal Revenue Service, found that a disproportionately large share of the income flows from industries that are the most preferentially taxed accrue to households in the highest marginal tax brackets.

Allocational effects of the structure of taxing capital income, including the effects of the corporate income tax, have also been the subject of considerable research. This research includes studies of specific assets such as owner-occupied housing (De Leeuw and Ozanne 1981; Aaron 1972) and tax-exempt bonds, (Ott and Meltzer 1963; Galper and Toder 1981; Hendershott 1981), analyses of the effects of taxation on corporate financial policies (Cordes and Sheffrin 1981), and general equilibrium models emphasizing the effects of differential taxation of capital income on the allocation of capital among industrial sectors.[7] More recently, Joel Slemrod (1983) and Hendershott and Shilling (1982) have developed general equilibrium models that not only explicitly incorporate tax considerations into household portfolio choices, but introduce risk aversion into these choices as well.[8]

Since the Slemrod and Hendershott-Shilling models focus explicitly on household holdings of differentially taxed assets, they could be used to measure distributional effects if expanded to include a sufficiently large number of households. However, Hendershott and Shilling, using a model that takes each household's marginal tax rate as given, deal with four representative households. Slemrod's approach specifically treats the marginal tax rates of individual households as endogenous when each faces an exogenous schedule of rates, but has only nine representative households.

Nonetheless, these as well as earlier cited works suggest the possibility of significant implicit tax and transfer effects resulting from our current tax structure or from changes in it. For example, Hendershott (1981) and Galper and Toder (1981) both find that substantial increases in the supply of tax-exempt bonds will not only tend to increase tax-exempt rates, thereby reducing implicit taxes for holders of tax-exempt bonds, but will also cause taxable rates to rise, generating increases in implicit transfers at the same time. In a similar vein, Hendershott and Shilling (1982, p. 269) find that changes in tax law enacted in 1981 could give rise to an equilibrium response of an almost two percentage point rise in the real before-tax rate of return on fully taxable securities.

Thus, the structure of taxing capital income has the potential of creating substantial implicit taxes and transfers. To address the source of these effects more formally, we develop in the next section an illustrative model of the demand and supply of differentially taxed assets.

3.3 Model of Capital Allocation and Portfolio Choice

This section outlines the basic structural features of the model developed to examine the long-run allocational and distributional effects of changes in the taxation of income from capital. A formal presentation of this model is provided in appendix A. The model can be used to solve simultaneously for the value of physical capital in each productive sector, aggregate supplies of each type of financial claim, rates of return on financial claims and physical assets, after-tax income of each representative household, and total federal revenue, given assumptions about the tax rules, the level of federal debt, the parameters of the demand schedules for the services of physical assets, and total factor supplies of each household.

The model takes account of major features of the tax system—the two-level tax on corporate income, the tax preferences made available for investments in business machinery and equipment, the favorable taxation of capital gains relative to dividend and interest income, the exemption from tax of interest on state and local bonds, the deductibility of interest paid to finance housing and other consumer durables, and the graduated tax rate structure. On the other hand, differences in the effective rate of taxation among industries are not modeled, although the impacts of these interindustry tax differences can readily be incorporated into an expanded model based on the same general framework used in this paper. In addition, the model at this stage of development fails to account for differential perceived risks from holding different assets.

In the model, households finance the entire capital stock either directly or indirectly through the purchase of financial claims issued by other sectors. The capital stock so financed consists of capital used in private business, capital used by state and local governments, and capital used within the household sector (owner-occupied homes and other consumer durables). In addition, households finance a predetermined level of federal debt. The model assumes that total factor endowments (labor and wealth) of each household are fixed. Therefore, the total capital stock is equal to household wealth minus the federal debt.

Corporations, state and local governments, and the federal government issue claims to households to finance capital investments in the business and state and local sectors and to finance the federal debt. In addition, some households issue debt to other households to finance investments in business sector capital by unincorporated enterprises and to finance capital used within households. Each capital-using sector finances its stock of capital with assumed fixed proportions of taxable bonds, tax-exempt bonds, and equity claims unique to that sector. Each saver allocates its wealth among these competing assets to maximize after-tax income, given the before-tax returns available on alternative assets, the tax treatment of each asset, and the schedule of marginal tax rates.

The net cost of capital to each capital-using sector, and thus the desired holdings of physical capital, depend on the rates of return (gross of personal taxes) on the claims issued to finance its capital stock and the taxes imposed at the enterprise level (the corporate tax). The entire economy is in equilibrium at the set of yields at which the demand for each type of claim by households is equal to the supply of each type of claim issued by corporations, governments, and other households to finance the acquisition and maintenance of the capital stock.

3.3.1 Household Demand for Assets

The five types of assets available to households, ordered by degree of taxability, are: (1) fully taxed claims (corporate bonds, loans for home mortgages and other purchases of consumer durables, loans to unincorporated enterprises, and federal government bonds); (2) partially taxed claims (corporate equity); (3) noncorporate equity capital (the noncorporate capital stock net of debt incurred to finance shares in partnerships and proprietorships); (4) tax-exempt bonds (state and local public purpose bonds and industrial development bonds); and (5) equity in consumer durables (capital employed directly within the household sector, net of home mortgages and other debt incurred to finance holdings of housing and other consumer durables).

The first four assets provide market-determined returns in the form of interest, dividends, capital gains, and net earnings of unincorporated enterprises; the fifth asset provides in-kind returns in the form of a flow of services (net of interest, depreciation, and operating costs). In the remainder of the paper, the two general categories of assets are denoted as "market assets" and "consumer durables."

The before-tax return received by a household from any market asset is independent of the quantity of the asset it holds. However, the after-tax return to a household on market assets depends on the household's entire portfolio allocation because the higher the net taxable income from the portfolio, the higher is the household's tax bracket. In contrast, for consumer durables, the amount of the asset purchased by any single household affects both its before-tax and after-tax return. As its stock of consumer durables increases, the household realizes diminishing marginal utility, and thus a lower before-tax return, from durables.

Households are assumed to issue a fixed amount of debt per dollar of equity in unincorporated enterprises and a separate fixed amount of debt per dollar of equity in consumer durables. The resulting interest deductions reduce, but do not eliminate, the tax on net income from unincorporated business. For equity in consumer durable holdings, the net tax is negative because interest deductions reduce taxable income, while the service value from durables is not taxed. The model at this stage does not permit borrowing for purchases of corporate equity and, following current law, also does not permit borrowing for tax-exempt bonds.

Since the four market assets available to households differ only in tax characteristics, households can compute the after-tax return on each market asset given the before-tax rate of return, the tax law treatment, and the household's marginal tax rate. Figure 3.1 illustrates how these after-tax returns vary with the marginal tax rate. In figure 3.1, the most heavily taxed asset is fully taxed claims (F), followed in successive order by partially taxed claims (P), equity in noncorporate capital (B), and tax-exempt claims (E). The before-tax rates of return on each asset—i_f, i_p, i_b and i_e—are illustrated on the vertical axis passing through the origin; the after-tax returns in the 70 percent bracket—y_e (.70), y_b (.70), y_p (.70), and y_f (.70)—are illustrated along the vertical line on the right side of the graph. The slope of each line represents the decline in after-tax return per unit increase in the marginal tax rate. For the fully taxed asset, the slope of the line F, dy_f/dt_j, is equal to $-i_f$; for the less heavily taxed assets, the

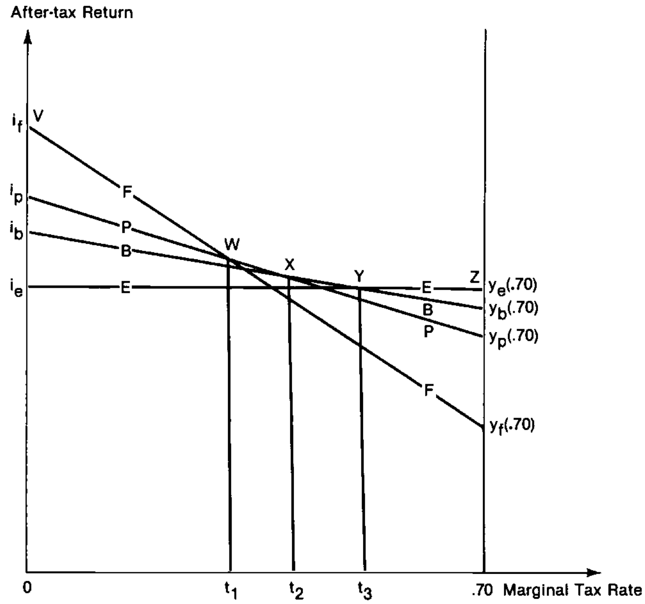

Fig. 3.1 After-tax returns on financial assets

slopes of lines P, B, and E become successively flatter. Line E has a zero slope, reflecting the fact that the after-tax return is equal to the before-tax return on tax-exempt bonds for any marginal tax rate.

The before-tax yield on each asset must be sufficiently high to make the after-tax yield dominate for at least *some* marginal tax rate brackets. Figure 3.1 shows that the steeper lines—that is, the most heavily taxed assets, dominate in the lowest tax brackets, while less heavily taxed assets provide the highest after-tax returns in the highest tax brackets. In figure 3.1, asset F dominates for marginal tax rates less than t_1; asset P, for marginal tax rates between t_1 and t_2; asset B, for marginal tax rates between t_2 and t_3; and asset E, for marginal tax rates greater than t_3.

Under current law, taxpayers are faced with a marginal tax rate schedule that increases in discrete steps. Except for the unusual case where after-tax returns on two assets are *exactly the same* at one statutory marginal tax rate, one asset will generally dominate all others at any point on the marginal tax rate schedule. That is, given a marginal tax rate, there will be one market asset that any household should hold to maximize after-tax income. The series of linear segments—$VWXYZ$—trace out the maximum after-tax marginal yields available for every marginal tax rate bracket.

However, the marginal tax rate facing any household is itself determined in part by its portfolio allocation. As a household replaces less heavily taxed with more heavily taxed assets in its portfolio, its marginal tax rate will rise. Thus, solving for the optimal portfolio allocation involves solving for both the marginal tax rate and the optimal allocation of assets at that marginal tax rate.

Figure 3.2 gives some indication of how the household should allocate its wealth to maximize after-tax income in a two-asset world, where taxpayers are not allowed deductions for interest costs incurred to finance tax-exempt assets. In figure 3.2, the two assets are taxable bonds and tax-exempt bonds. For purpose of illustration, the tax-exempt rate is taken to be 7 percent and the before-tax taxable rate to be 10 percent. The line segments *WXY* trace out the efficient portfolios at any marginal tax rate. Below a 30 percent marginal tax rate, taxable bonds dominate; above a 30 percent rate, tax-exempt bonds dominate.

In this situation, there are three general types of households:

(1) Household 1 has a marginal tax rate of less than 30 percent when all of its assets are in taxable bonds. That is, when total taxable income is equal to wage income (net of the zero bracket amount and excess itemized deductions) plus 10 percent of wealth, the household has insufficient taxable income to reach the 30 percent marginal tax rate. It can be seen from figure 3.2 that household 1 should hold its entire portfolio in taxable bonds.

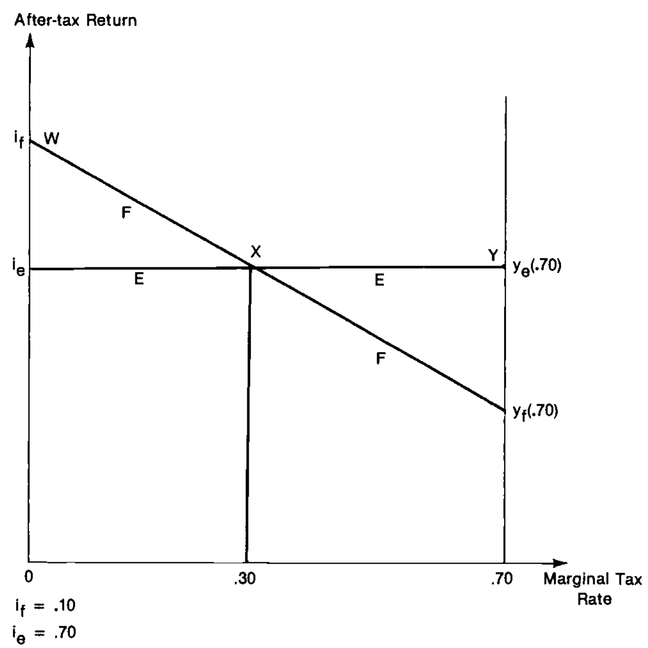

Fig. 3.2 After-tax returns in a two-asset world

(2) Household 2 is faced with a marginal tax rate above 30 percent from wage income (net of deductions and the zero bracket amount) alone. Figure 3.2 shows that household 2 should hold its entire portfolio in tax-exempt bonds.

(3) Household 3 has a marginal tax rate of less than 30 percent based on wage income alone. If all its wealth were in tax-exempt bonds, its marginal tax rate would remain unchanged from that based on net wage income, and taxable bonds would have a higher after-tax yield than tax-exempt bonds. Household 3 will therefore substitute taxable for tax-exempt bonds in its portfolio. As taxable bonds are substituted for tax-exempt bonds, the marginal tax rate of the household rises, moving it in the direction of point X. At point X, when the marginal tax rate reaches 30 percent, further substitution of taxable for tax-exempt bonds will reduce the after-tax yield on the portfolio because it will move the household into the tax bracket where tax-exempt bonds dominate. Therefore, household 3 will be in equilibrium *at the portfolio mix* which makes its marginal tax rate exactly equal to the marginal tax rate at which the after-tax yields of the two assets are equalized.

If the household faces a discrete tax rate schedule, with the marginal tax bracket jumping from 28 percent to 32 percent, it will hold the mix of assets such that one more dollar of taxable income will place it in the 32 percent bracket. The household will be right on a cliff—it will pay a 28 percent top rate (therefore, after-tax income will decline if tax-exempt bonds are substituted for taxable bonds), but would pay a 32 percent rate if it increased its taxable income by one dollar (therefore, after-tax income will also decline if another dollar of taxable bonds is substituted for tax-exempt bonds).

Thus, we can see that there are solutions where one asset dominates and solutions where the household holds both assets. The key feature of the two-asset solution is that it occurs at a critical point in the tax rate schedule. The household holds just enough of the taxed asset to make its taxable income exactly at the break point where one dollar more of taxable income would be taxed at the higher rate, and one dollar less at the lower rate.

This discussion of the optimal allocation of wealth among financial claims in a two-asset world can be generalized to a world of multiple assets with differential tax characteristics. Each market asset will be dominant in a particular tax bracket. Solutions are of two types—single-asset solutions and mixed-asset solutions. In single-asset solutions, the household holds one asset; the taxable income from that asset combined with the taxable income from wages, net of personal exemptions and deductions other than for interest payments incurred to finance business assets, places the household in a marginal tax rate bracket where the after-tax return from that asset is higher than the after-tax return on all other market assets. In mixed-asset solutions, the household is holding two assets adjacent to each other in tax rate characteristics (either fully taxable and partially taxed, partially taxed and noncorporate business, or noncorporate business and tax-exempt bonds). The taxable income from the more heavily taxed of the two assets is just enough, when combined with net taxable income from other sources, to place the household on the border between two marginal tax brackets. In the lower tax bracket, the more heavily taxed of the two market assets being held is preferred; in the higher tax bracket, the less heavily taxed of the two assets is preferred.

A computer algorithm has been developed to allocate household wealth among market assets and consumer durables, based on these general characteristics of a solution to the problem of maximizing the after-tax return on a portfolio of tax-differentiated assets. The algorithm first solves for the allocation of wealth among market assets, given an initial value of consumer durables. Then, optimal holdings of consumer durables are recomputed, given the holdings of market assets. A solution is reached by successive iterations in which the after-tax return from the entire portfolio is maximized.

In this final equilibrium, the after-tax return on holding consumer durables must equal the opportunity cost of holding them. The opportunity cost is the incremental after-tax return received by the household on the optimally invested portfolio when one additional dollar of wealth is available for investment in market assets. The after-tax return from a dollar of equity in consumer durables (which must be equated to this opportunity cost) is a function of the marginal service value per unit of durables and the after-tax cost to the household of borrowing to finance durables (itself a function of the interest rate on fully taxed securities and the household's marginal tax rate). In equilibrium, therefore, the household is maximizing its after-tax return from its portfolio of financial assets and holding an amount of consumer durables that makes the after-tax return on consumer durables equal to the after-tax return that could be earned if the household optimally invested a one dollar larger financial portfolio.

The entire tax-filing population is represented by 101 households. Appendix B describes the characteristics, method of selection, and allocation of wealth to these households. Each household has a fixed labor income, a fixed amount of wealth to allocate among the five assets, and a fixed amount of wealth assumed to be in pension funds. Pension wealth is invested on behalf of the household in fully taxed claims. Since capital income accumulated within pension funds is not subject to tax, after-tax income is maximized when this component of wealth is invested in fully taxed claims, the asset class with the highest before-tax return. For other income, each household faces the 1979 tax rate schedule for joint returns and is assigned a zero bracket amount, which includes the value of itemized deductions other than interest deductions or the standard deduction, whichever is greater. It is assumed that the first dollar of interest cost is deductible.

3.3.2 Supply of Assets by Business and Government

As noted above, business firms and governments supply market assets to households to finance their holdings of productive capital. Each type of enterprise is assumed to issue a fixed ratio of financial claims per dollar of capital stock used by the enterprise. Thus, reallocations of the capital stock among types of enterprises cause changes in the relative amounts of the four tax-differentiated market assets available to households.

Corporations and noncorporate enterprises are assumed to produce the same goods and services which sell for the same price. Corporations supply a fixed ratio of corporate equity (P), taxable bonds (F), and tax-exempt bonds (E) to households. The net cost of capital to corporations is a function of the rates of return (before individual taxes) on the three claims (i_p, i_f, and i_e), the corporate tax rate, and the rules for measuring taxable corporate income (including any available tax credits). Corporate tax rules are assumed parameters of the model. Noncorporate enterprises receive the same gross-of-tax return as corporations.

The total supply of all claims issued by business enterprises is determined by the demand for productive capital in the business sector. This demand for capital, derived implicitly from the demand for private goods and services in the economy and from a business sector production function, is a downward sloping function of the net cost of capital to corporations. Thus, the total supply of all claims issued by business enterprises is also a function of the corporate cost of capital.

In equilibrium, corporations and noncorporate enterprises must earn the same before-tax return on physical capital, since they are assumed to supply the same goods and services, despite the tax advantage to noncorporate enterprises from not having to pay the corporate income tax. To replicate current aggregate household holdings of corporate and noncorporate market assets, given this noncorporate tax advantage, we assume the rate of return to households on noncorporate equity claims is lower than the net cost of capital to corporations. Specifically, we assume that the supply price or before-tax rate of return to households on noncorporate equity, i_b, is a constant fraction of the corporate cost of capital, reflecting a presumed inefficiency of noncorporate compared to corporate enterprises. In the absence of this presumed inefficiency, the tax advantages to the noncorporate sector from not being subject to the tax on corporate income would virtually eliminate the corporation as a form of business organization. (This relative "inefficiency" of noncorporate business could result from limited liability, economies of large-scale capital accumulation, or any other advantages of the corporate form. For a further discussion of this assumption and of alternative ways of modeling an economy with both corporate and noncorporate enterprises, see appendix A.)

State and local governments supply tax-exempt bonds to finance the public sector capital stock. (Industrial development bonds, tax-exempt bonds used to finance private business investments, are modeled as claims issued by private corporations.) The supply of tax-exempt bonds issued by state and local governments is a function of the net cost of capital in the state and local sector—the tax-exempt interest rate (i_e).

The supply of taxable bonds issued by the federal government is taken as predetermined in the model.

3.3.3 Equilibration of Supply and Demand

Given the implied household demand functions for market assets and consumer durables, the enterprise supply functions for market assets, and the fixed financing coefficients, the model solves for a set of yields on financial claims, i_f, i_p, *and* i_e, at which household demands for and enterprise supplies of market assets are equilibrated.

The aggregate demand for the four market assets and consumer durables held by households can be computed once one knows the before-tax returns on the three financial assets, i_f, i_p, and i_e. The return on equity in noncorporate enterprises, i_b, is, as noted above, a fraction of the net cost of capital to corporations. In turn, the net cost of capital to corporations can be computed directly from the interest rates on the three financial assets and the fixed financing coefficients for the corporate capital stock. The return on consumer durables for each household is expressed as a function of the household's stock of consumer durables. Given the four market rates of return and its demand schedule for the services of consumer durables, the model allocates each household's wealth among the five assets to maximize after-tax income. Aggregate demands for the five assets are then computed by summing the resulting individual household demands. Thus, household demands for the five assets can be represented implicitly as a function of the three rates of return on financial claims (i_f, i_p, and i_e).

The net household demand for fully taxed claims supplied by business enterprises and governments is equal to gross household demand for fully taxed claims minus household borrowing for consumer durables and noncorporate business. Since all other market assets are only supplied by business and government, net and gross household demands for these assets are equal.

On the other side of the market, the demand for the services of physical capital by governments and business enterprises can be represented, as discussed above, as a function of the rates of return on financial assets.

For any given allocation of the capital stock between governments and business enterprises, the supply of each market asset can be computed from the fixed financing coefficients once one knows the allocation of the business capital stock between corporate and noncorporate enterprises. The additional supply relationship which permits this latter allocation of the business capital stock to be calculated is the relationship between the before-tax rate of return on noncorporate capital and the net cost of capital to the corporate sector.

Thus, the net supplies of the four market assets to households can be calculated in two steps. First, the three relationships for the three capital stocks, in conjunction with the supply price relationship—the rate of return on noncorporate equity—determine the stocks of corporate and noncorporate capital, state and local capital, and federal debt. Second, the capital stocks used in each sector can be multiplied by the fixed financing coefficients to compute the supplies of the four market assets.

In summary, the model represents the two sides of the market in different ways. The supply of market assets by enterprises (and the demand for the services of consumer durables by households) is based on cost of capital considerations and fixed financing coefficients for each real sector of the economy; this analysis is similar to the sectoral analysis usually found in models concerned primarily with allocation effects. In contrast, the household demand for assets is based on the techniques of microsimulation rather than a series of equations in which the demand for each asset is represented as an explicit function of the relevant interest rates. To determine aggregate household demand, each representative household allocates a fixed total wealth among the five alternative assets, given before-tax yields and its tax circumstances, to maximize its total after-tax income. Then, the aggregate demand for each asset is calculated as a weighted sum of representative household demands.

An equilibrium solution is arrived at iteratively by varying the yields on the three financial claims until all asset demands match all asset supplies. The solution values for the yields on the three financial claims and the capital used in each sector can then be used to calculate the cost of capital to different capital-using sectors, the before-tax and after-tax incomes of each household, and total tax revenue.

3.3.4 Qualifications

A number of simplifying assumptions were made in developing the model sketched in this section. Since the major focus of this paper is distributional, we have tried to keep these simplifications in a form that does not limit the analysis of distributional effects, even though important allocational effects are not explored. For example, the business sector is represented as producing one uniform good even though current tax law is characterized by a range of effective tax rates across industries that have important effects on the allocation of the capital stock.[9] In our model, the various preferences for capital investment are summarized in a single parameter estimate of the percentage of business sector income included in the tax base. This parameter is then used to compute effective tax rates on the return to corporate and noncorporate capital.

The suppression of sectoral allocational effects should not greatly affect the findings in this paper because the major distributional effects at the household level depend on the relative supplies of differently taxed financial claims available to households and not on the types of physical capital financed by these claims. For example, the effects of aggregate changes in relative supplies of debt and equity can be examined directly in the model (by changing the assumed debt/equity ratios) without specifying separate industrial sectors.[10] However, the assumption of only one partially taxed financial asset and a uniform treatment of income from noncorporate capital does have direct effects on the measured income distribution. Representation in the model of a wider choice of noncorporate activities (e.g., tax-sheltered industries) and financial claims (e.g., stocks with different dividend payout ratios) would raise after-tax returns for taxpayers in the middle tax brackets.

Some of the simplifying empirical and behavioral assumptions in the model are worth special mention. First, households are assumed to finance all physical capital directly, thereby eliminating financial intermediaries from consideration, with the important exception of pension funds. Pension funds are included in the model because they are a means of changing the tax characteristics of asset earnings, allowing households to pay no tax on earnings from fully taxed securities. However, other tax benefits from purchasing securities through financial intermediaries—such as the tax exemption afforded to the accumulation of life insurance reserves—are not included in the model.

The general lack of financial intermediaries does give rise to one specific problem—the need to take account of the fact that, in 1979, about 75 percent of tax-exempt state and local bonds were held by commercial banks and other financial institutions and only 25 percent were held directly by households. It would be inappropriate for the model to place the entire stock of tax-exempt bonds in households' portfolios since such portfolio behavior would be inconsistent with maximization of after-tax income at the observed structure of interest rates. At the same time, state and local governments must be represented as benefiting from lower financing costs on the entire stock of bonds, not just the share absorbed directly by households.

To resolve this problem, we have assumed an intermediation role for the federal government. The federal government is assumed to pay an explicit subsidy to state and local governments equal to the difference between the tax-exempt and the taxable interest rate, inducing these governments to issue taxable securities. In our model, this subsidy is represented as a negative tax, the counterpart of the subsidy actually provided by the tax system under current law. The subsidy under current law results from the fact that financial institutions can deduct borrowing costs incurred for the purpose of holding tax-exempt securities and can, as a result, earn arbitrage profits by reducing their tax liabilities attributable to other sources of income.

A second simplification in the model is that, as a consequence of the assumption of direct household financing, liquidity considerations do not enter into household portfolio decisions. Each security of a given type is in effect assumed to be of a single maturity, bearing a before-tax yield appropriate to that maturity.

Third, in allowing households to adjust their portfolios immediately in response to tax factors, we assume that such adjustments are costless. In that sense, the analysis of alternative tax regimes in the model is a comparative statics exercise, comparing alternative long-run equilibrium solutions, although the long run in this case involves no changes in aggregate factor supplies.

Fourth, the model only analyzes the main elements of the tax structure. Relatively exotic tax shelters and complex financial transactions are ignored.

Finally, and most important, the model fails to account for the existence of risk as influencing individual and corporate portfolio decisions. In abstracting from risk considerations, the model differs from the work of Slemrod (1981), Hendershott and Shilling (1981), and Gravelle and Zimmerman (1984), each of whom specifically examines interactions between the tax system and risk taking. In contrast, our model in its current stage of development can examine the distributional and allocational effects of the major structural elements of the tax system only for a hypothetical risk-free world. Even in this form, the model can illustrate the general way in which structural tax provisions can give rise to implicit transfer benefits as well as implicit tax burdens compared to a world with no taxes on capital income. Moreover, if significant implicit transfer benefits can be generated under risk-free conditions, it is unlikely that adding risk to the model would change this general result. Recall that the implicit transfer payments arise because the before-tax returns on fully taxed assets increase as households shift their portfolios into tax-preferred assets. Even though the tax-preferred assets—in particular, equity in corporate and noncorporate business—are the riskier assets, a similar portfolio switch into tax-preferred assets and a similar increase in fully taxed yields would still occur in a world with risk, although the shifts may be moderated as household portfolios become increasingly risky.

The assumption of a risk-free world does, however, have two important implications that should be noted here. First, households do not need to diversify their portfolios to reduce risk, since all assets are risk free. Thus, household utility is maximized when after-tax income is maximized. Given its tax situation, each household, as shown above, will tend to choose the one asset (or in some cases two assets) that will maximize after-tax income. Some diversification will occur because of holdings of consumer durables and through the intermediation of pension funds, but in general households will tend to be plungers in the particular assets that maximize their after-tax incomes.

Second, the yield from the corporate income tax is vastly reduced—to a simulated level of $11.5 billion annually in 1979—in our model of a risk-free world. One main reason for this result is that the return to corporate equity, as noted, is much lower when both debt and equity have zero riskiness. Therefore the simulated pre–corporate tax return to equity and the corporate tax are both much lower than actual returns and taxes. In fact, under the parameters assumed in the model, any increase in pre–corporate tax returns to equity to compensate for risk is likely to be taxed at virtually full 46 percent rates, thereby generating substantial additional corporate tax revenues.[11]

3.4 Calibration of Model and Simulation Results

3.4.1 Base Case Conditions

The model developed in the previous section was calibrated to replicate the 1979 values of the holdings of each market asset by all households in the aggregate, each individual household's holdings of consumer durables, and the physical capital stocks used by each sector given a before-tax yield on fully taxed assets equal to 12 percent. This calibration was done by assuming unitary elasticities in the sectoral demand for physical capital functions and in each household's demand for consumer durables and then choosing values for the scale parameters in these functions. The model then generated rates of return for the market assets other than fully taxed securities.

The year 1979 was selected for the base period because it is the last year for which tax return information is available from the Treasury's individual income tax model. This tax return information was used in conjunction with data from the Board of Governors of the Federal Reserve System (1981) on national balance sheets for 1979 to estimate the physical capital stocks used by each sector, the financial claims issued to finance these stocks, and the holdings of market assets and consumer durables by each household. The data base was assembled in two stages. In stage one, a consistent set of aggregates for financial and physical capital stocks were developed; in stage two, the relevant assets were distributed to households according to information on individual tax returns. These estimation procedures are discussed in more detail in appendix B.

The results of the calibration for the 1979 base case are shown in tables 3.1 through 3.4. Table 3.1 shows the financing of the capital stock by sector and the aggregate volume of claims—over $7 trillion—thereby generated. For example, based on the national balance sheets, adjusted as discussed in appendix B, the corporate capital stock is one-quarter debt financed, including a small proportion of tax-exempt debt financing, and about three-quarters equity financed. Unincorporated business is over 85 percent equity financed, and household durable capital is financed one-half by debt and one-half by equity.

Table 3.1 **Financing of Capital Stock and Aggregate Household Claims: Base Case (1979 law) ($ billions)**

Financing of Capital Stock	
Corporate capital	2,017.1
Equity	1,508.6
Taxable bonds	487.3
Tax-exempt bonds[a]	21.2
Capital in unincorporated enterprises	1,709.7
Equity	1,463.5
Taxable bonds	246.2
Household sector capital	2,473.4
Equity	1,236.7
Taxable bonds (mortgages and other consumer loans)	1,236.7
State and local capital	276.4
Tax-exempt bonds[a]	276.4
Federal debt	600.0
Total	7,076.6
Household Claims	
Taxable bonds[b]	2,792.5
Corporate equity	1,508.6
Equity in unincorporated enterprises	1,463.5
Equity in consumer durables	1,236.7
Tax-exempt bonds	75.3
Total	7,076.6

[a]Households hold directly $75.3 billion of total tax-exempt issues of $297.6 billion. The other $222.3 billion are held by financial intermediaries that finance their purchases by issuing fully taxable claims to households.

[b]Of this amount, households hold $598.6 billion in pension funds and the other $2,193.9 billion directly. Households pay no tax on the income from assets held in pension funds.

Table 3.2 Capital Allocation and Rates of Return: Base Case (1979 law)

Capital Stock ($ billions)	
Business sector capital	3,726.8
Corporate capital	2,017.1
Capital—unincorporated enterprises	1,709.7
Household sector capital[a]	2,473.4
State and local capital	276.4
Total capital stock	6,476.6
Federal debt	600.0
Total household wealth	7,076.6
Rates of Return (percent)	
$i_f = 12.000$	
$i_p = 9.357$	
$i_e = 7.100$	
$r_c = 10.544$	
$hr_c = 9.109$	

Numbers may not sum to totals because of rounding.

i_f = yield on fully taxed claims, i_p = yield on partially taxed claims, i_e = yield on tax-exempt claims, r_c = before-tax yield on corporate capital, hr_c = before-tax yield on noncorporate capital.

[a]Owner-occupied housing and consumer durables.

Table 3.2 shows more directly the sectoral allocation of the physical capital stock (including federal government debt) and the before-tax rate of return on fully taxed bonds (i_f), partially taxed corporate equities (i_p), and tax-exempt bonds (i_e). Table 3.2 also shows the net of depreciation cost of capital for the corporate sector (r_c) and the before-tax return available to holders of noncorporate capital (hr_c).

The rate of return on equities (i_p) is a risk-adjusted return. The spread between taxable and tax-exempt yields—about 40 percent—is almost identical to that used by Slemrod (1981) and reflects a combination of the 45–50 percent spreads betwen tax-exempt and taxable bonds in shorter maturities and the 30–35 percent differential between long-term taxable and tax-exempt bonds in the late 1970s.

Tables 3.3 and 3.4 show total wealth and simulated asset holdings by wealth class and income class in the 1979 base case. Other than pensions and consumer durables, the tendency toward asset specialization is clear. As an extreme case, table 3.3 shows that only those with wealth greater than $5 million hold tax-exempt bonds. The concentration of wealth is also evident. The wealthiest 8.3 percent of tax returns—those with wealth of $200,000 or more—hold 58.4 percent of total wealth. Similar results may be seen in table 3.4, where wealth holdings are arrayed by income class. For example, households with income of $100,000 or more account for 1.5 percent of total returns and hold 27.5 percent of total wealth.

Table 3.3 **Simulated Holdings of Wealth by Wealth Class: Base Case (1979 law) ($ billions)**

		Type of Claim							
Wealth Class ($ thousands)	Number of Returns (thousands)	Fully Taxed	Partially Taxed	Equity in Noncorp. Business	Tax-Exempt	All Market Assets[a]	Pensions	Equity in Consumer Durables	Total Wealth
0–10	30,198	0	0	0	0	0	41.0	201.0	242.0
10–50	34,761	224.4	0	0	0	224.4	194.0	461.3	879.8
50–100	13,197	407.7	58.0	1.5	0	467.2	158.0	249.1	874.3
100–200	6,821	634.7	102.7	17.5	0	754.9	76.7	112.7	944.3
200–500	5,395	589.1	720.5	79.6	0	1,389.2	70.0	112.2	1,571.4
500–1,000	1,695	337.9	359.5	304.0	0	1,001.4	33.7	51.5	1,086.6
1,000–5,000	530	0	268.0	569.8	0	837.8	19.4	33.5	890.7
5,000+	92	0	0	491.2	75.3	566.5	5.7	15.3	587.5
Total	92,690	2,193.9	1,508.6	1,463.5	75.3	5,241.3	598.6	1,236.7	7,076.6

Numbers may not sum to totals because of rounding.

[a]Excluding pensions.

Table 3.4 **Simulated Holdings of Wealth by Income Class: Base Case (1979 law) ($ billions)**

		Type of Claim							
Income Class ($ thousands)	Number of Returns (thousands)	Fully Taxed	Partially Taxed	Equity in Noncorp. Business	Tax-Exempt	All Market Assets[a]	Pensions	Equity in Consumer Durables	Total Wealth
0–5	17,354	13.7	0.0	0.0	0.0	13.7	5.7	104.9	124.3
5–10	17,966	152.5	0.0	0.0	0.0	152.5	32.9	133.8	319.2
10–15	12,740	287.0	0.0	0.0	0.0	287.0	46.5	98.3	431.9
15–20	8,882	165.5	0.0	0.0	0.0	165.5	51.2	93.4	310.2
20–30	15,895	642.8	0.0	0.0	0.0	642.8	130.7	230.7	1,004.2
30–50	14,997	665.6	561.6	0.0	0.0	1,227.2	191.2	356.7	1,775.1
50–100	3,433	266.8	640.8	60.0	0.0	967.6	78.1	121.7	1,167.4
100–200	1,096	0.0	306.2	504.5	0.0	810.8	40.3	56.7	907.7
200+	327	0.0	0.0	899.0	75.3	974.2	22.1	40.3	1,036.7
Total	92,690	2,193.9	1,508.6	1,463.5	75.3	5,241.3	598.6	1,236.7	7,076.6

Numbers may not sum to total because of rounding.
[a]Excluding pensions.

3.4.2 Simulation Results: Elimination of Taxation of Income from Capital

Starting from the base case, we have simulated the long-run effects of eliminating all taxes on capital income on the portfolio choices of households, rates of return, and the allocation of physical capital. This simulation was performed by solving the model for the case where there is only one market asset, with no taxes imposed on its return, the corporate income tax is eliminated, and households are no longer allowed tax deductions for interest on consumer, mortgage, or business loans. Since the portfolio choices facing households are differentiated only by tax and not by risk characteristics, only one type of market asset emerges in the model when taxes on the return to savings are eliminated. The household's portfolio then reduces to a choice between holding consumer durables, which provide a return in terms of service value, and holding the one undifferentiated market asset. Holdings of pension funds are assumed to remain unchanged.

On the capital-using side of the model, corporations and state and local governments continue to demand capital services and supply the one market asset according to the previously calibrated functions specifying their demand for physical capital.

In equilibrium, the household demand for this one market asset equals the total supply issued by all capital-using sectors. The equilibrium interest rate is the rate at which the household demand matches the supply by corporations, governments, and those households that borrow to finance their holdings of consumer durables.

When taxation of capital income is eliminated, there is effectively only one business sector, and the distinction between corporate and noncorporate enterprise disappears. In terms of the model, this is accomplished by having all activity performed in the corporate sector inasmuch as less efficient noncorporate enterprises can no longer compete with corporations once their relative tax advantages have been removed. Furthermore, since there are no longer tax-differentiated assets in the absence of capital income taxes, the distinction between corporate and noncorporate enterprise has no significance for the distribution of tax burdens.

We assume that the revenue loss from eliminating capital income taxation is balanced either by an increase in taxation of wage income or a reduction in public services. Neither of those changes would affect the allocation of the stock of capital in our model once the returns on capital income were not subject to tax. However, an increase in federal debt to offset the tax reduction would affect capital allocation because federal debt absorbs some private wealth holdings and therefore "crowds out" investments in physical capital by private firms, households, and state and local governments.

Because we do not specify how the revenue effect of eliminating capital income taxation is compensated for, our results do not show the differential incidence from alternative tax structures. Rather, we provide estimates of the specific incidence of taxation among income groups without identifying who would otherwise pay tax or who benefits from public services.

Tables 3.5 through 3.10 summarize the results of our simulation. Table 3.5 shows the allocation of the capital stock among uses and the interest rate on all assets in the case where capital income taxation—$42 billion of revenue in our estimates—is eliminated. The equilibrium interest rate of 9.282 percent is between the tax-exempt rate in the base case (7.1 percent) and the fully taxable rate in the base case (12 percent). This change in interest rates means that the cost of capital financed by tax-exempt claims (mostly state and local capital) rises while the cost of capital financed by fully taxed claims falls. The net (of depreciation) rental cost of corporate sector capital declines from 10.544 percent to 9.282 percent.

As a result of these changes in the cost of capital compared to the base case, capital in the private business sector (all business enterprises) increases by 6.5 percent, capital in the household sector (consumer durables) declines by 7.2 percent, and capital in the state and local sector declines by 23.5 percent. Since the state and local sector is relatively small in the base case, this large proportionate decline does not free up substantial resources for other capital-using sectors. The federal debt remains constant by assumption.

The effect on consumer durables from eliminating taxation of capital income is a more complicated story. The decline in overall holdings of consumer durables masks important differences in the effects on consumer durable investment for different households. The 9.282 percent cost of capital in the no-capital-income-tax world is lower than the cost of holding consumer durable capital under 1979 law for some households

Table 3.5 Capital Allocation and Rates of Return: No Capital Income Taxes

Capital Stock	Amount ($ billions)	Change from Base Case ($ billions)	Change from Base Case (%)
Business sector capital	3,969.0	242.3	+6.5
Household sector capital	2,296.1	−177.3	−7.2
State and local capital	211.4	−65.0	−23.5
Federal debt	600.0	0.0	—
Total household wealth	7,076.6	0.0	—
Rate of return on all assets = 9.282%.			

Numbers may not sum to totals because of rounding.

and higher than this cost of capital for others. For households in the zero tax bracket, the cost of holding household capital declines and the equilibrium stock of consumer durables *rises* when capital income taxes are eliminated because they previously had to pay 12 percent after-tax for borrowed funds and could earn 12 percent on financial assets by buying fully taxed securities. In contrast, for households in higher brackets, the cost of holding consumer durables increases significantly because they lose the benefits of deducting interest payments and because the returns they could formerly earn on market assets were relatively low. On average, the cost of holding household capital rises, and the equilibrium stock of consumer durables declines.

Table 3.6 shows how removal of capital income taxation alters the simulated holdings of wealth by wealth class. Households in the lowest wealth class ($0–$10,000) hold wealth only in the form of pensions and consumer durables in the 1979 base case and, therefore, have no opportunity to increase consumer durable holdings in the simulated no-capital-income-tax world. However, the second lowest wealth class contains some households for whom the cost of holding consumer durables declines and the opportunity exists to increase such holdings, and other households for whom the cost of durables rises. On balance, this wealth class shifts $0.2 billion in wealth out of market assets into consumer durables. All other wealth classes increase their net holdings of market assets and reduce holdings of consumer durables; the largest proportionate drop in consumer durable holdings occurs in the highest wealth classes.

Table 3.6 **Simulated Holdings of Wealth by Wealth Class: No Capital Income Taxes ($ billions)**

Wealth Class ($ thousands)	Type of Claim: Market Assets[a]	Type of Claim: Pensions	Type of Claim: Consumer Durables	Change in Market Assets[b]	Total Wealth
0–10	0	41.0	201.0	0.0	242.0
10–50	224.2	194.0	461.5	−0.2	879.8
50–100	491.3	158.0	225.0	24.1	874.3
100–200	768.7	76.7	98.9	13.9	944.3
200–500	1,409.7	70.0	91.7	20.5	1,571.4
500–1,000	1,014.9	33.7	38.0	13.5	1,086.6
1,000–5,000	848.8	19.4	22.5	11.0	890.7
5,000+	572.3	5.7	9.4	5.9	587.5
Total	5,330.0	598.6	1,148.0	88.7	7,076.6

Numbers may not sum to totals because of rounding.
[a]Excluding pensions.
[b]Compared to base case (equal and opposite to change in consumer durables).

The differences between base case yields on market assets and consumer durables and the uniform return to wealth in a world with no capital income taxes constitute the implicit taxes and transfers that are the basic subject of this paper. These implicit taxes and transfers for groups of households can be measured by comparing capital income in the 1979 law base case with income from capital when there are no capital income taxes. These comparisons are presented in tables 3.7 and 3.8. Table 3.7 shows the distribution of capital income and total income by income class under both the 1979 law base case and a tax system with no capital income taxes. Table 3.8 shows the distribution of explicit and implicit taxes by income class.

The concepts used to measure capital income and taxes in tables 3.7 and 3.8 merit further discussion. In table 3.7, the column labeled "Capital Income, 1979 Law" is the measure of capital income that most closely conforms to the income concept used by P-O. Capital income under 1979 law is measured as the sum of the before-tax yield on all financial assets, the before-tax yield on equity in unincorporated business (net of interest payments), the imputed rental income from consumer durables (again, net of interest costs), and the imputed corporation income tax. Following the procedure recommended, though not strictly applied, by P-O for the case where all capital bears the corporate income tax, we allocate the imputed corporate tax to households in proportion to wealth.

The column "Capital Income: No Capital Income Taxes" shows the distribution of income computed by our simulation of capital allocation and returns from investment in a world without capital income taxes.

Table 3.7 **Distribution of Income by Income Class ($ billions)**

		Capital Income				
Income Class ($ thousands)	Number of Returns (thousands)	1979 Law	No Capital Income Taxes	Implicit Tax[a]	Labor Income	Total Income
0–5	17,354	15.1	15.9	0.7	41.8	57.7
5–10	17,966	33.5	31.3	−2.2	114.5	145.9
10–15	12,740	46.9	40.5	−6.4	126.6	167.2
15–20	8,882	32.1	28.9	−3.2	129.2	158.1
20–30	15,895	105.9	93.3	−12.6	293.7	387.1
30–50	14,997	170.4	164.8	−5.6	407.5	572.2
50–100	3,433	110.0	108.4	−1.6	132.8	241.2
100–200	1,096	78.9	84.3	5.3	62.3	146.5
200+	327	87.0	96.2	9.2	30.8	127.0
Total	92,690	679.9	663.6	−16.3	1,339.3	2,002.9

Numbers may not sum to totals because of rounding.
[a]Capital income when no capital income taxes minus capital income under 1979 law.

Since in this world there is only one rate of return that is common to all capital, including consumer durables, the capital income of each household is simply equal to its wealth multiplied by the rate of return. Implicit taxes and transfers arise because this rate of return differs from the rate of return *before-tax* that households receive under current law.

The calculation of 1979 law capital income shown in table 3.7 raises two important conceptual points. The first concerns the method of measuring imputed rental income from housing and other consumer durables, and the second, the method of accounting for the subsidy that the tax system provides to commercial banks for their holdings of tax-exempt securities.

Our measure of imputed rental income differs from the conventional measure used in the national income accounts. The problem we confront is what before-tax return to impute to a household from an asset that provides its return in the form of services rather than dollars. It is tempting to use the market rental value of those services as the measure of the return—the method used to estimate the imputed income from owner-occupied housing in the national income accounts. This measure would be correct in a world with no taxes. However, because the tax advantages to consumer durable investment are contingent on the fact that the capital services are *not* rented, there is no reason to expect the household to equate the marginal productivity of its capital in consumer durables to the market return on durables. Rather, when the household, behaving as a business firm would, equates the marginal productivity of the capital with the cost of obtaining it, marginal productivity is in general not equal to the market rent because tax provisions differentially affect the cost of capital in household and market activities.

To be consistent with the measurement of the before-tax return to financial claims and corporate assets, we must impute to the household a return on equity in consumer durables equal to the opportunity cost, in terms of foregone returns on market assets, of holding an extra dollar of equity in consumer durables.[12] This opportunity cost in most, but not all, cases is *lower* than the market rental value of the services of durables because the cost of capital to *most* households for investment in durables is *lower* than the cost of capital to the corporate sector. For households in the zero tax bracket, however, the cost of capital for consumer durables is higher than the cost of capital to corporations because in our simulated base case the before-tax return on fully taxed securities, i_f, is greater than the cost of capital to the corporate sector, r_c.

Using this measure of imputed rental income from consumer durables, the net imputed before-tax capital income from *equity* in consumer durables is equal to:

$$[1/(1-f_4)]\,(y_d - f_4 i_f),$$

where y_d is the opportunity cost of equity in consumer durables, f_4 the fraction of consumer durable capital financed by debt, and i_f the fully taxed interest rate.

It is important to stress that this procedure for measuring the before-tax income from consumer durables is conceptually distinct from the measurement of implicit taxes and transfers. The issue discussed here concerns the correct measurement of before-tax returns from capital realized under existing tax rules. In contrast, implicit taxes and transfers arise because current before-tax returns to capital are themselves different from what they would be in the absence of taxation.

The income measures reported in table 3.7 must also reflect the assumed subsidy to tax-exempt financing. As discussed above, banks and other financial institutions receive benefits in the form of lower taxes for holding state and local debt. In this way, these institutions serve as a vehicle for conveying a federal subsidy that lowers the cost of capital to state and local governments, relative to the return received by households, without directly altering tax liability at the household level. This subsidy or negative tax is treated as part of the tax system and, accordingly, is reflected in net taxes and before-tax income of households in the 1979 base case. The subsidy (negative tax) is allocated among households in proportion to their simulated holdings of fully taxed securities.

Table 3.8 provides a breakdown of explicit and implicit taxes by household income class. Explicit taxes include individual income taxes—allocated between capital income and labor income—the corporate income tax, and the negative tax (i.e., the subsidy) for tax-exempt bonds. Implicit taxes are broken down into two categories—changes in before-tax interest received from holdings of federal debt and all other changes in before-tax capital income resulting from the entire system of capital income taxation. Individual income taxes are allocated between taxes on labor income and taxes on capital income by stacking labor income first. This means that the first dollar marginal tax rate on income from capital is the marginal tax rate on the last dollar of taxable wages, net of all deductions other than interest.

In table 3.8, explicit taxes on individual capital income are zero for the lowest income class because those households are all in a zero tax bracket. Total explicit taxes on individual capital income are negative for households with income between $5,000 and $10,000 because of the deductibility against labor income of interest costs incurred to finance holdings of housing and other consumer durables. Explicit taxes are positive for all classes with income greater than $10,000 and increase relative to labor taxes, reflecting the composition of income, as income increases.

The corporate income tax is allocated in proportion to total household wealth. The tax-exempt subsidy is allocated according to holdings of taxable securities. The total simulated corporate income tax for all house-

Table 3.8 **Distribution of Taxes by Income Class ($ billions)**

Income Class ($ thousands)	Explicit Taxes: Individual Income Taxes: Labor	Explicit Taxes: Individual Income Taxes: Capital	Explicit Taxes: Individual Income Taxes: Total	Explicit Taxes: Corporate Income Tax	Explicit Taxes: Tax-Exempt Subsidy[a]	Implicit Taxes: Change in Federal Bond Interest	Implicit Taxes: Other	Total Capital Taxes	Total Taxes
0–5	0	0	0	0.3	0.1	−0.1	0.9	0.9	0.9
5–10	6.4	−1.3	5.0	0.5	0.7	−1.1	−1.1	−3.7	2.7
10–15	10.6	2.9	13.5	0.7	1.3	−1.9	−4.4	−4.1	6.5
15–20	13.4	1.5	15.0	0.5	0.8	−1.3	−1.9	−2.0	11.5
20–30	37.1	9.8	46.9	1.6	3.0	−4.5	−8.1	−4.2	33.0
30–50	68.9	11.9	80.8	2.9	3.3	−5.0	−0.6	5.8	74.7
50–100	30.6	4.7	35.3	1.9	1.3	−2.0	0.4	3.6	34.2
100–200	18.1	5.0	23.1	1.5	0.2	−0.2	5.6	11.7	29.8
200+	10.0	6.8	16.8	1.7	0.1	−0.1	9.3	17.6	27.6
Total	195.1	41.4	236.5	11.5	10.9	−16.3	0.0	25.7	220.9

Numbers may not sum to totals because of rounding.

[a]Treated here as a negative tax.

holds is almost exactly offset by the tax-exempt subsidy, leaving total explicit taxes on capital income only slightly above simulated taxes paid directly at the household level.

Table 3.8 also shows implicit taxes by income class. Since it is assumed in the model that the elasticity of demand for capital services is unit elastic with respect to the net (of depreciation) cost of capital, total before-tax income from all physical capital assets—capital used in corporate and noncorporate business, in state and local governments, and in households—does not vary with changes in the cost of capital. However, since the quantity of Federal debt is assumed to be fixed, total interest earnings on federal debt vary directly with changes in the rate of interest.

As shown in Table 3.5, the equilibrium interest rate simulated when there are no capital income taxes is 9.282 percent. The difference between this return and the yield on fully taxed securities in the 1979 base case represents an implicit subsidy to holders of fully taxed bonds. Since the federal government issues a fixed quantity of fully taxed bonds, federal borrowing costs and total income to holders of federal debt are higher in the 1979 base case than in the no-capital-income-tax equilibrium. In other words, the simulation results imply that the 1979 system of capital income taxation increased the cost of federal borrowing by $16.3 billion. This net implicit subsidy to holders of taxable securities offsets part of the revenue gain from taxing capital income, although the offset takes the form of an increased outlay rather than a reduction in federal revenue.

Implicit taxes for each income class measure the difference between capital income in the absence of capital income taxes and before-tax capital income under 1979 law. Since total before-tax income from capital is fixed, the total implicit tax, net of the increased interest on the federal debt, is zero. However, as table 3.8 shows, the tax system does affect the distribution of before-tax capital income by income class because it alters the pattern of before-tax yields among tax-differentiated assets. In general, before-tax capital income is increased (implicit taxes are negative) for taxpayers in lower and middle income groups, and reduced (implicit taxes are positive) for taxpayers in the highest income groups.

The last two columns of table 3.8 show total capital taxes and total taxes by income class. Total capital taxes are computed by adding explicit and implicit taxes. Thus, while total explicit taxes on capital income (net of the tax-exempt subsidy) add up to $42.0 billion, the total tax on capital income is only $25.7 billion. The difference of $16.3 billion represents the increased interest paid on the federal debt. Total taxes are the sum of taxes on capital income and taxes on labor income. The top income class with 14.5 percent of capital income and 6.3 percent of all income pays 68.5 percent of total capital income taxes and 12.5 percent of all taxes.

Table 3.9 shows the computation of effective tax rates by income class

Table 3.9 Effective Tax Rates (ETR) by Income Class

Income Class ($ thousands)	Effective Tax Rate on Capital Income: Traditional Method[a] (percent)	Effective Tax Rate on Capital Income: Full ETR Method[b] (percent)	Effective Tax Rate on All Income: Traditional Method[c] (percent)	Effective Tax Rate on All Income: Full ETR Method[d] (percent)
0–5	1.3	5.9	0.4	1.6
5–10	−4.4	−11.7	3.3	1.8
10–15	4.8	−10.1	7.4	3.9
15–20	3.7	−6.9	9.1	7.2
20–30	8.0	−4.4	11.4	8.5
30–50	6.7	3.5	13.9	13.1
50–100	4.8	3.4	14.8	14.2
100–200	8.0	13.9	17.3	20.3
200+	9.7	18.3	15.6	21.7
Total	6.2	3.9	11.7	11.0

Numbers may not sum to totals because of rounding.

Income is as reported in table 3.7; taxes as shown in table 3.8

[a](individual capital income tax + corporate tax − tax-exempt subsidy)/(capital income, 1979 law).

[b](total capital taxes)/(capital income, no capital income taxes).

[c](total explicit taxes)/(labor income + capital income, 1979 law).

[d](total taxes)/(total income).

on capital income and on all income under the traditional and full effective tax rate (ETR) methods. Under the traditional method, the tax rate, as discussed in section 3.2, is defined as the ratio of explicit taxes paid to before-tax income. The tax rate on capital income rises to 8.0 percent for households with income between $20,000 and $30,000, then declines to 4.8 percent for households with incomes between $50,000 and $100,000, and rises again to 9.7 percent for households with income greater than $200,000. In contrast, the full effective tax rate on capital income—with the exception of the bottom class, the peculiarity of which is discussed below—rises throughout the income scale except for a minor dip at the $50,000–$100,000 class. The full effective tax rate is negative for households with income between $5,000 and $30,000, remains less than 4 percent for households with income between $30,000 and $100,000, and then jumps to 13.9 percent for households with income between $100,000 and $200,000 and to 18.3 percent for households with income greater than 200,000.

The tax rate on all income, measured by the traditional method, increases as income rises up to a peak of 17.3 percent for the $100,000–$200,000 income class, but then declines to 15.6 percent for households with income greater than $200,000. The full effective tax rate rises throughout the income scale as income rises. Thus modifying the measure of tax burdens, to take account of implicit taxes and subsidies, reverses the finding that tax rates begin to decline at the highest income levels.

Two further points should be made about the data shown in table 3.9. First, the measure of full effective tax rates is independent of the assumptions used to allocate corporate taxes and the tax-exempt subsidy among income classes. The full effective tax rate calculation depends only on a comparison between after-tax income in the 1979 base case and before-tax income in a world with no capital income taxes. Since corporate taxes and the tax-exempt subsidy alter the measures of explicit taxes paid and before-tax capital income by the same amount, they do not affect the measure of after-tax income in the base case.

The second point is an explanation of the high effective tax rate in the lowest income class. The general result that implicit taxes are greater for high-income taxpayers than for low-income taxpayers—a consequence of the fact that high-income taxpayers hold tax-preferred financial assets with lower before-tax returns—does not apply to the measure of implicit taxes on holdings of consumer durables by some households. The reason for this anomaly is that households' total holdings of consumer durables are constrained in the model (by an assumption that consumer durables are 50 percent debt financed) to be no more than twice total household wealth. For some households, consumer durable holdings represent their entire asset portfolio in the 1979 base case. If these households are in very low tax brackets, they would prefer to hold more consumer durables in the zero tax world because their after-tax interest costs are lower. However, these households are constrained by total available wealth because the model does not permit additional borrowing for the purchase of consumer durables.

Since holdings of consumer durables for these households are the same in both the base case and the no-tax case, the total service value must be the same; however, interest costs are higher in the 1979 base case. Thus, for selected households—those with low marginal tax rates who are constrained from increasing their holdings of durables—the net before-tax income from consumer durables (i.e., the difference between the service flow and the interest costs) is lower in the 1979 base case than in the no-tax world. These selected households pay a positive implicit tax in the form of higher financing costs on holdings of consumer durables. This accounts for the 5.9 percent effective tax rate for the lowest income class in table 3.9. (Relaxing the borrowing constraint in subsequent development of this model would eliminate this effect. Low wealth taxpayers would be permitted to increase consumer durable holdings in the no-capital-tax case, driving down their before-tax returns, and to decrease their holdings as the cost of borrowing rises, thereby maintaining the same net before-tax income from durables.)

Table 3.10 Rates of Return in Different Marginal Tax Brackets

Marginal Tax Rate (percent)	Dominant Market Asset[a]	Rate of Return (percent)			Effective Tax Rate (percent)	
		Before Individual Tax	After Tax	No Capital Income Taxes	Traditional Method[b]	Full ETR Method
0	F	12.000	12.000	9.282	−1.93	−29.28
14	F	12.000	10.320	9.282	12.34	−11.18
16	F	12.000	10.080	9.282	14.38	−8.60
18	F	12.000	9.840	9.282	16.42	−6.01
21	F	12.000	9.480	9.282	19.48	−2.13
24	F	12.000	9.120	9.282	22.53	1.75
28	F	12.000	8.640	9.282	26.61	6.92
32	F	12.000	8.160	9.282	30.69	12.09
37	P	9.357	7.972	9.282	16.26	14.11
43	P	9.357	7.748	9.282	18.61	16.53
49	B	8.622	7.526	9.282	14.33	18.92
54	B	8.622	7.414	9.282	15.61	20.12
59	B	8.622	7.302	9.282	16.88	21.33
64	B	8.622	7.190	9.282	18.16	22.54
68	B	8.622	7.101	9.282	19.17	23.50
70	E	7.100	7.100	9.282	2.25	23.51

[a]F = fully taxed claims
P = partially taxed claims
B = net equity in noncorporate business.
E = tax-exempt claims.

[b]Includes imputed corporate tax equal to .1631 cents per dollar of wealth and tax-exempt subsidy equal to .3901 cents per dollar of wealth in fully taxed claims.

Table 3.10 gives some further indication of what lies behind the results in table 3.9 by showing how taxation affects the returns earned by households in different marginal tax brackets. The column labeled "Dominant Market Asset" in table 3.10 shows the asset with the highest after-tax return (other than consumer durables) in each marginal tax bracket. As marginal tax rates increase, after-tax returns available to savers decline; however, the rate of decline is slowed by the existence of tax-preferred assets. The before-tax rate of return declines in three discrete steps at those marginal tax rates where it just pays to switch to a less heavily taxed asset.

The effective tax rate as measured by the traditional method increases in each tax bracket up to the point where the investor switches to a less heavily taxed asset. Where the investor is holding fully taxed assets, the effective tax rate is slightly less than the statutory marginal tax rate because the tax-exempt subsidy is greater than the imputed corporate tax for holders of fully taxed securities. Above the 32 percent bracket, the measured effective tax rate drops sharply with the shift from fully taxed to partially taxed assets because the measured before-tax income declines.

At each other switch point, the marginal tax rate again declines, falling to 2.25 percent (all attributable to the corporate tax) in the 70 percent bracket.

In contrast, the full effective tax rate measure shows a negative tax rate in the lowest tax brackets because the tax system, by raising the yield on fully taxed assets, enables low-bracket taxpayers to earn higher after-tax yields than they would earn in a world with no capital income taxes. The full effective tax rate increases monotonically with marginal tax rates because after-tax yields decline. However, as taxpayers switch to more tax-preferred assets, the inclusion percentage also declines; therefore, increases in marginal tax rates beyond a certain point are associated with smaller reductions in after-tax yields. At the extreme, where the preferred asset is the tax-exempt claim, further increases in statutory marginal tax rates have no effect on full effective tax rates. Thus, while the full effective tax rate calculation, in contrast to the traditional method of estimating effective tax rates, shows that the effective tax rate increases continuously with increases in the statutory tax rate, the progressivity of the tax system is much milder than it would be in the absence of preferences. In comparison with the top statutory rate under 1979 law of 70 percent (plus an imputed corporate tax), the results of the simulations show a maximum marginal tax rate on capital income, using the full ETR method, of only 23.51 percent.

3.5 Conclusions

The complex structure of capital income taxation in the United States causes significant changes in the relative returns to wealth ownership realized by different groups of taxpayers. By altering the relative before-tax yields on assets with different tax treatments, the tax system provides transfers to some capital income recipients in the form of higher before-tax and, in some cases, higher after-tax yields than would have been available absent any taxation of capital income; at the same time, the tax system imposes implicit taxes, in the form of reduced before-tax yields, on other capital income recipients. These implicit transfers and taxes are not captured in traditional approaches to measuring the burden of taxes on capital income.

The simulations shown in this paper indicate that these implicit transfers and implicit taxes might be quite large and that taking their existence into account could alter qualitative conclusions about the distribution of tax burdens. In particular, the preliminary results suggest that the pre-1981 system of capital income taxation provided net transfers to lower- and middle-income households (with income less than $30,000) and imposed much larger taxes on upper-income households than would be shown by traditional methods of measuring tax burdens.

The results presented in this paper were generated using a model of portfolio choice and capital allocation in which households allocate available wealth to maximize after-tax returns and in which the demand for physical capital by capital-using sectors is a function of the net cost of capital services. The model specifically accounts for the interaction between after-tax returns and the tax rate structure for a diverse and representative sample of U.S. households. However, further modifications of the model will be necessary to verify and to expand the tentative conclusions reached in this paper.

The major changes required are to expand the model to take account of risk as well as after-tax return as a determinant of portfolio choice, to increase the number of capital-using sectors, to allow households a greater choice among financial claims, and to specify more explicitly the production relationships and the demand for final goods. While these revisions in the model would enable us to refine our results and to increase the range of issues that could be considered, they are unlikely to alter the basic conclusion that the taxation of capital income gives rise to significant transfer effects by changing the relative before-tax yields of different assets.

Appendix A Formal Presentation of Model of Capital Allocation and Portfolio Choice

This appendix presents formally the equations of the model outlined in section 3.3 and provides further explanation of the assumptions embodied in the model.

Assets Available to Households

Households allocate their wealth among five types of assets—fully taxed claims, partially taxed claims (corporate equity), noncorporate equity capital, tax-exempt bonds, and equity in consumer durables. For the purposes of the model, households regard all assets within each asset type as equivalent.

The five assets available to households are characterized as follows:

Fully Taxed Claims

Fully taxed claims include corporate bonds, loans for home mortgages and other purchases of consumer durables, loans to unincorporated enterprises, and federal government bonds. All of these assets have the same before-tax yield and are therefore indistinguishable to the households who own them, although they are issued by different borrowers to finance different types of investments.

The after-tax return on fully taxed claims available to household j is:

$$\text{(A1)} \qquad y_{fj} = i_f(1 - t_j),$$

where i_f is the before-tax return and t_j is the marginal tax rate of household j. The total stock of fully taxed claims is equal to F.

Partially Taxed Claims

Partially taxed claims consist of corporate equity. All equity shares are assumed to have the same dividend payout rate and the same expected holding period before realization of capital gains becomes a taxable event. The income from corporate shares is treated as partially taxed at the shareholder level because taxation of the portion of that income that accrues in the form of appreciation in the value of shares is deferred until realization and at that time partially excluded from the tax base.

The after-tax return on corporate equity available to household j is:

$$\text{(A2)} \qquad y_{pj} = i_p\ (1 - at_j),$$

where i_p is the return available to shareholders before individual income taxes (but net of any corporate level tax) from corporate equity and a is the fraction of i_p that is effectively included in the tax base. The value of a is taken to be equal to 0.4 in the simulations shown in section 3.4. Note that tax preferences at the corporate level increase the before-tax yield available to all households by the same amount, while the tax savings from preferences at the shareholder level vary with the household's marginal tax rate.

The total stock of partially taxed claims is equal to P.

Noncorporate Equity Capital

Noncorporate capital includes all capital used in partnerships and proprietorships. In the model, one business sector produces all private goods and services, although some enterprises are organized as corporations and others as partnerships and proprietorships. We assume that corporations and noncorporate enterprises hold the same mix of capital and are subject to the same rules for defining taxable business income. However, for corporations taxes are imposed on taxable income of the entity and on dividends and capital gains received by shareholders. In contrast, for noncorporate enterprises taxable business income (net of interest deductions) is attributed directly to households.

Households are assumed to borrow from other households to finance a fixed fraction of equity in unincorporated enterprises. The ratio of debt to total wealth invested is f_3. The after-tax return, per dollar of *equity*, in unincorporated enterprises available to household j is:

$$\text{(A3)} \qquad y_{bj} = [1/(1-f_3)] \\ [(1-zt_j)i_b - f_3 i_f(1-t_j)].$$

In equation (A3), f_3 is the share of *all* assets in unincorporated enterprises financed by debt, z is the percentage of business income subject to tax, and i_b is the before-tax rate of return, per dollar of capital invested in unincorporated enterprises. The expression $(1 - zt_j)i_b$ represents the gross after-tax income per dollar invested in unincorporated enterprises; net of tax interest costs equal to $f_3 i_f(1 - t_j)$ are subtracted to obtain after-tax income net of interest costs. The term $1/(1 - f_3)$ converts yield per dollar of total capital to yield per dollar of equity.

The term z summarizes the effects of all business sector tax preferences, including tax depreciation at rates faster than economic depreciation and the investment tax credit. Conceptually, z should vary with both the discount rate (which determines how an acceleration of deductions translates into the equivalent of a permanent change in taxable income) and the marginal tax rate (which determines the value of tax credits in terms of tax deductions). Thus, z should vary among individual taxpayers and should also vary with other changes in tax policy that affect equilibrium market interest rates. However, for simulating the model we collapsed all of these provisions into one parameter representing the average percentage of business income included in the tax base. The value of z used in the model is equal to 0.4. In contrast, if there were no investment credit and if tax depreciation matched economic depreciation in a world with no inflation, the value of z would be equal to 1.0.

In this model, z serves two important functions. It both approximates the degree of tax preference directly available to households from ownership of assets in unincorporated enterprises and also measures the effective tax rate at the corporate level.

As noted, the model has only one business sector. Since corporations and unincorporated enterprises compete with each other in the same markets, the rental price of capital services must be the same for both types of enterprises.

If activities in corporate and noncorporate forms were equally efficient, unincorporated businesses would displace most corporate activity because their tax advantages would enable them to provide a higher after-tax return to most households who supply equity financing. The tax advantages to noncorporate enterprises relative to corporations result because the former are not subject to a separate tax at the enterprise level.[13]

To account for the existence of a large corporate sector in the model, despite the tax advantages of partnerships and proprietorships, we assume noncorporate activity is, in some sense, inherently less efficient than corporate activity.[14] In other words, if r_c is the total return to corporate capital (on both debt and equity), then hr_c $(h < 1)$ is the return to noncorporate enterprises. Recall that this return is represented in equation (A3) as i_b. Although less efficient, unincorporated enterprises can compete successfully with corporations because of preferential tax treatment.

The total amount of equity in noncorporate enterprises is denoted as B. The total stock of capital employed in noncorporate enterprises is B^*, where $B^* = B/(1 - f_3)$.

Tax-Exempt Bonds

Tax-exempt bonds are issued directly by state and local governments to finance all capital stocks held by those governments and also on behalf of corporations to finance a portion of the private capital stock. Tax-exempt bonds used to finance corporate sector investments, generally referred to as industrial development bonds, are indistinguishable to households from traditional tax-exempt bonds.

The after-tax yield available to all households on tax-exempt bonds is:

(A4) $$y_e = i_e,$$

where i_e is the before-tax return on tax-exempt bonds.

Equity in Consumer Durables

Consumer durable capital consists of housing, automobiles, furniture, and other durable goods employed directly within the household sector. Households issue to other households a fixed amount of debt per dollar of equity in consumer durables. The after-tax return, per dollar of leveraged equity in consumer durables, is:

(A5) $$y_{dj} = [1/(1 - f_4)]\,[i_{dj}(D_j^*) - f_4 i_f(1 - t_j)].$$

In equation (A5), f_4 is the fraction of *all* consumer durable capital financed by debt, and D_j^* is the total amount of consumer durable capital owned and used by household j. The value of household j's equity in consumer durables is $D_j = (1 - f_4)D_j^*$.

Equation (A5) expresses the fact that households pay no tax on the income from consumer durable capital (i_{dj}) but are allowed to deduct the costs of debt incurred to hold consumer durables. This deduction reduces the cost of borrowing from $f_4 i_f$ to $f_4 i_f(1 - t_j)$.

As discussed in the text, households receive a before-tax return from holding consumer durables in the form of a flow of services rather than monetary income. The marginal value of these services, i_{dj}, is computed from the equation:

(A6) $$D_j^* = D_{0j}/i_{dj}.$$

Equation (A6) represents the demand for consumer durable services of household j as a downward-sloping function of the net rental cost of household capital (i_{dj}) with a demand elasticity of -1.0. The value D_{0j} is a constant assigned to household j; this value is set in calibrating the model so that each sample household will hold its estimated stock of consumer durables under 1979 law.

Summing over all households, the total value of household equity in consumer durable capital is denoted as D. The total value of consumer durable capital is $D^* = D/(1 - f_4)$.

Household Demand for Assets

Households choose among the five available assets to maximize after-tax income, where income includes the dollar value of services from consumer durables and is net of after-tax interest costs.

The computer algorithm that allocates each household's wealth among the five assets is discussed in the text. Summing over all households, the results of this maximization procedure can be summarized in the equation:

$$(F, P, B, E, D) = f(i_f, i_p, i_b, i_e). \tag{A7}$$

The before-tax return on consumer durables, i_d, can be solved for any household from the function $i_{dj}(D_j^*)$ described in equation (A6).

As noted, households issue fully taxed securities to finance holdings of equity in noncorporate enterprises and consumer durables. Therefore, the net household demand for fully taxed securities issued by corporations and governments is equal to:

$$S = F - f_3 B/(1 - f_3) - f_4 D/(1 - f_4), \tag{A8}$$

where S is net demand of the household sector for fully taxed securities.

Supply of Financial Assets by Business Firms and Governments

Private corporations, unincorporated enterprises, state and local governments, and the federal government all supply financial claims to households to finance the private and public physical capital stock and federal government debt.

Private Corporations

Corporate sector capital is financed by taxable debt, tax-exempt debt, and partially taxed claims (corporate equity). The share of each type of claim in the corporate financial structure is taken to be fixed. The net (of depreciation) rental cost of capital, r_c, is equal to:

$$r_c = [1/(1 - zu)] \\ [f_2 i_f (1 - u) + e_2 i_e (1 - u) + p_2 i_p]. \tag{A9}$$

In equation (A9), f_2 is the share of corporate capital financed by fully taxable bonds, e_2 is the share of corporate capital financed by tax-exempt bonds, p_2 is the share of corporate capital financed by equity, u is the corporate tax rate (.46), and z is the proportion of corporate income subject to tax. This formulation implies that, while interest is deducted at the statutory corporate rate of 46 percent, the market return need only be enough to cover the "effective" corporate tax rate of zu.[15]

The total demand for capital services in the business sector (corporate and noncorporate) is taken to be a downward function of the net cost of capital services, with a demand elasticity of -1.0. This can be expressed as:

(A10) $$K = K_0 / r_c,$$

where K is the demand for capital in private business activity.

The total amount of physical capital in the business sector can, in turn, be expressed as the sum of the capital employed within corporations, C, and the capital employed in noncorporate enterprises, hB^*. Thus, for any amount of household holdings of noncorporate equity, the supply of each financial asset by corporations can be computed by multiplying the fixed financial ratios for corporate capital by $(K - hB^*)$, the total capital employed in the corporate sector. Equations (A11a)–(A11c) summarize these relationships:

(A11a) $$E^c = e_2 \left[K(i_f, i_p, i_e) - hB^*(i_b)\right],$$

(A11b) $$P^c = p_2 \left[K(i_f, i_p, i_e) - hB^*(i_b)\right],$$

(A11c) $$F^c = f_2 \left[K(i_f, i_p, i_e) - hB^*(i_b)\right].$$

In equations (A11a)–(A11c), E^c, P^c, and F^c represent the volume of tax-exempt, partially taxed, and fully taxed assets supplied by corporations to households.

Noncorporate Enterprises

From equations (A11a)–(A11c) it can be seen that the supply of claims by corporations depends on the demand for physical capital in the corporate sector and the rate of return available to households on noncorporate equity capital, i_b. This supply price relationship can be expressed as:

(A12) $$i_b = hr_c,$$

where h, as noted above, represents the ratio of the productivity of capital in the noncorporate and corporate sectors, and r_c is the net of depreciation cost of capital services supplied by corporations.

State and Local Governments

For state and local governments, no taxation occurs at the enterprise level. All capital is assumed to be financed by tax-exempt bonds. The net rental cost of capital is equal to i_e. The demand for capital services by state and local governments can be expressed as:

(A13) $L = L_0 / i_e$,

where L_0 is a constant. Equation (A13) expresses the demand for the services of state and local capital as a downward-sloping, unit elastic function of the net cost of capital to state and local governments.

Finally, the supply of tax-exempt bonds by state and local governments can be expressed as:

(A14) $E^L = L(i_e)$.

Federal Government

The federal government issues fully taxable claims to finance a government debt set equal to G. Therefore, we can express the supply of claims by the federal government as:

(A15) $F^G = G$,

where G is taken to be exogenous.

The equations for the demand for capital services by households (D^*), business firms (K), and state and local governments (L) are all expressed as unit elastic functions of the net cost of capital. These demand functions may be viewed as a convenient way of summarizing production function relationships for each use of capital (the elasticity of substitution of labor for capital), relative factor shares in output, and the price elasticity of demand for final output (see Allen 1964, pp. 369–74). We do not deal with these production and demand-for-final-output relationships explicitly in this stage of the model's development.

Equilibration of Supply and Demand

The entire model can be solved for a set of yields on financial assets, i_f, i_p, and i_e at which household demands for and firm and government supplies of all assets are equilibrated.

The model can be summarized by a system of eight equations in eight unknowns: i_f, i_p, i_e, i_b, S, P, E, and B. From equations (A7) and (A8), we can characterize net household demands for the four assets as a system of four equations implicitly solved by the computer algorithm developed for maximizing after-tax income of households:

(A16) $S^d = S^d\ (i_f, i_p, i_b, i_e)$,

(A17) $P^d = P^d\ (i_f, i_p, i_b, i_e)$,

(A18) $B^d = B^d\ (i_f, i_p, i_b, i_e)$,

(A19) $E^d = E^d\ (i_f, i_p, i_b, i_e)$.

On the other side of the market, the supply of each asset can be expressed as the sum of the amount of the asset issued by each capital-using sector. As described above, the total supply of each asset depends on the shares of business sector capital accounted for by corporate and noncorporate enterprises. This division of the business capital stock is solved for by an equation which expresses the supply price of equity in unincorporated enterprises as a function of the rates of return on financial claims.

The four supply equations can thus be expressed as:

(A20) $$S^s = F^C + F^G = f_2\,[K(i_f,\ i_p,\ i_e) - hB^*\ (i_b)] + G,$$

(A21) $$P^s = P^C = p_2\,[K(i_f,\ i_p,\ i_e) - hB^*\ (i_b)],$$

(A22) $$E^s = E^C + E^L = e_2\,[K(i_f,\ i_p,\ i_e) - hB^*\ (i_b)] + L(i_e),$$

(A23) $$i_b = hr_c(i_f,\ i_p,\ i_e).$$

Equations (A16)–(A23) are solved by a process of iteration in which initial trial values of i_f, i_p, and i_e are altered to equilibrate all demands and supplies.

The equilibrium solutions can then be used to compute equilibrium values of total household holdings of each asset, the capital stocks financed by those assets, and the cost of capital to different sectors, given the fixed financing coefficients (e_2, f_2, p_2, f_3, and f_4) for corporate sector capital, capital in unincorporated enterprises, and consumer durables, and the formula for computing the cost of capital to the corporate sector (eq. [A9]).

Appendix B *Estimation of Household Wealth*

The estimation of household wealth distributions for use with the simulation model presented in appendix A entailed three separate operations: (1) the selection of a sample of households to represent the entire tax-filing population;[16] (2) the calculation of the total amount of wealth to be allocated to these households; and (3) the development of allocation procedures to distribute these wealth totals to the selected households. This appendix discusses each of these steps in turn.

The tax-filing population is represented by 101 tax returns categorized as a matrix of ten labor income classes and ten capital income classes, and one extra return from the highest labor and capital income classes. The income classes were selected from the 1979 Treasury individual tax model. Each labor income class represents approximately 10 percent of wage income; each capital income class represents approximately 10 percent of capital income, other than income from consumer durables and pension funds. The lowest capital income class, however, has no capital income (other than imputed rent from consumer durables and the return on pension funds) and accounts for about 40 percent of all households. To compensate for this, the other nine capital income classes account for about 11 percent of capital income each, again excluding the return to durables and pension funds. In addition, the two lowest labor income classes together account for 10 percent of wage income, and the other eight classes each account for slightly more than 10 percent of wages. The 100th cell of the ten-by-ten matrix, in the highest labor and capital income classes, has been subdivided into two cells of equal size to capture a part of the extreme variation in wages and wealth among the highest income households.

Each sample tax return is assigned the mean labor income and capital income for all tax returns represented by its labor and capital income cell. The sample returns are then weighted by the number of returns in each cell to represent the total tax-filing population.

The second operation, the calculation of wealth totals, begins with national balance sheet data developed by the Board of Governors of the Federal Reserve System (1981). These national balance sheets have then been adjusted to make the data internally consistent and to implement our basic framework of having the household sector finance all physical capital and the debt issues of the federal government.

To assure internal consistency, it was necessary to resolve the discrepancy in the Federal Reserve Board data between two measures of net worth of the corporate sector: (1) corporate net worth as measured by the difference between corporate physical assets valued at replacement cost and financial liabilities net of financial assets, and (2) corporate net worth as measured by the market value of equities. The difference between these two measures of net worth is substantial—over $1 trillion in 1979 values. A resolution is needed to assure that households, through their holdings of corporate debt and equity, exactly finance the physical capital stock used by corporations. Following the wisdom of Solomon, we split the difference—that is, we increased the market value of equities by about one-half trillion dollars and reduced the value of the physical capital stock used by corporations by the other half trillion dollars.

The percentage decrease in the value of reproducible physical assets held by corporations was then applied to the value of the corresponding physical assets used by other sectors, again as taken from the national balance sheets, in order not to change the relative size of the capital stock in each sector. To match the financing with the physical capital, nondebt financing was correspondingly adjusted in each case. In this way, physical capital stocks for each sector, along with the claims issued to finance this capital, were derived.

Also, in developing the data, we explicitly account for special tax provisions that encourage certain financial intermediaries—commercial banks and fire and casualty insurance companies—to hold tax-exempt bonds in their portfolios. As a result, the volume of tax-exempt bonds issued by state and local governments and corporations in 1979 (about $300 billion) does not match the volume held by households (about $75 billion). To preserve this difference between tax-exempt bonds held by households and those issued by state and local governments and corporations, we have assumed, as noted in the text, that about $225 billion of bonds considered to be tax-exempt to their issuers are considered to be taxable in the hands of households.

Furthermore, since the household sector in the Federal Reserve Board data includes balance sheet information for nonprofit institutions as well, physical capital held by nonprofits, and a corresponding volume of debt, was subtracted from the balance sheet totals to derive financial statements appropriate to the household sector alone. The results are presented in table 3.1.

The third step in developing the wealth distributions is the allocation of these wealth totals among the 101 sample tax returns. For this purpose we used information on each sample tax return to allocate each type of asset individually. Corporate equities were allocated in proportion to dividends reported on tax returns; taxable bonds, in proportion to interest income; equity in noncorporate enterprise, by business income (adjusted for losses); consumer durables, in proportion to mortgage and other nonbusiness interest expense (imputed to the file by the Treasury Department for tax returns not itemizing deductions); and pension wealth, according to a rough estimate of each household's total wage earnings over its previous work history. Because no tax return information exists on earnings from tax-exempt assets, such assets were assigned only to tax returns in the highest wealth classes.

Wealth has been allocated on an asset-by-asset basis primarily to derive as accurate a distribution of total wealth as possible. With the exception of consumer durables and pension wealth, use of the simulation model (see appendix A) requires a figure for only the size of each household's portfolio and not its composition. Given its total portfolio (other than pensions and consumer durables), each household chooses an asset mix that maximizes its after-tax return. A separate estimate is required for pension wealth since its return is tax-exempt, and households, accordingly, always invest pensions in the highest yielding asset before taxes. Consumer durables are also a special case in that the return to durables is not a market yield but an in-kind flow of services. The value of these services for any level of consumer durable holdings is determined by a demand schedule, unique to each household, for the services of consumer durables. Values are selected for the scale parameters in these demand schedules to replicate each household's assigned consumer durable holdings. In our simulations, households then reevaluate their optimal consumer durable holdings in response to changes in the tax structure.

While the distributions of wage income and wealth are as accurate as we could make them short of embarking on a major data gathering effort, these distributions, nonetheless, remain only approximations, in part because data on tax returns are not perfect allocators of total taxpayer wealth. Pension wealth and equity in noncorporate business, in particular, could be subject to substantial misestimation. However, for the purpose of this current paper, which is largely expository, we believe that our allocation methods provide usable approximations of wealth ownership. Tables 3.3 and 3.4 show these distributions.

Notes

1. See, for example, Prest (1955).

2. Pechman and Okner (1974). This study was updated by Okner (1980). In this later study, Okner used the same methodology and found essentially the same results for 1970 as for 1966.

3. Alternative assumptions regarding the incidence of the corporate tax are also examined by P-O, such as forward shifting to consumers and backward shifting to labor. In each case, the before-tax incomes of those ultimately bearing the tax are adjusted accordingly.

4. In fact, in the simulations shown in section 3.4, we assume that the traditional method correctly allocates the corporate tax burden in proportion to household wealth rather than realized capital income.

5. This before-tax income is not necessarily the same as income reported for tax purposes since items not subject to tax, such as state and local bond interest and net rent on owner-occupied homes, are imputed by P-O to individual households.

6. Some of these other provisions are discussed in Galper and Zimmerman (1977).

7. The most comprehensive general equilibrium model of the tax system, itself an elaboration of the pathbreaking work of Harberger (1962), has been developed by John Shoven and his colleagues. See, for example, Fullerton, Shoven, and Whalley (1983) and Goulder, Shoven, and Whalley (1983). Also see Hendershott and Hu (1980; 1981). For a more general discussion of the economic effects of the structure of capital income taxation, see Steuerle (1982) and Bradford (1980). Bradford emphasizes that our current structure, as a "halfway" house between an income tax and a consumption tax, affords numerous opportunities for manipulation by taxpayers, yielding gains to them but little, or even negative, social product.

8. The model developed by Hendershott and Shilling draws heavily on Slemrod's work. Furthermore, just as the general equilibrium model of Shoven et al. can be considered an extension of Harberger, Slemrod's work is an extension of an earlier paper written jointly with Feldstein (Feldstein and Slemrod 1980) that modified the basic Harberger approach. The Feldstein-Slemrod paper suggests that an understanding of the effects of the corporate income tax also requires an analysis of household portfolio behavior since, for some higher bracket taxpayers, the corporate tax may not be an additional tax but rather a way of avoiding even higher individual taxes. This can occur because, for corporations that retain earnings rather than distribute dividends, the combination of the corporate tax plus capital gains taxes ultimately paid by households on income retained by the corporation may be less

than individual taxes paid on dividends received. Gravelle and Zimmerman (1984) also have developed a model in which both tax and risk considerations affect household portfolio decisions.

9. See, for example, *Economic Report of the President* (1982), p. 124, and Jorgenson and Sullivan (1981).

10. Of course, there may be some systematic causal relationships between the degree of preferential taxation by industry and the use of debt and equity financing. Such relationships are lost by our simplification.

11. The simulated finding of a greatly reduced corporate tax in a risk-free world is consistent with the recent work of Roger Gordon and Burton Malkiel, who analyze the corporate tax as essentially a tax on risk taking (Gordon 1981; Gordon and Malkiel 1981). In particular, Gordon is critical of models of capital allocation that ignore risk and uncertainty while at the same time assuming that corporate returns to capital (and tax collections) would be unchanged in a risk-free world. One implication of Gordon's position is that corporate taxes in a risk-free world would indeed be quite small.

12. For a similar analysis applied to household holdings of automobiles and other conventional consumer durables, see Katz and Peskin (1980).

13. However, the combination of the corporation tax and capital gains treatment of retained earnings could impose lower total taxes on high-bracket households (under 1979 law) than would direct allocation of all business taxable income to the household with no corporation income tax. See Feldstein and Slemrod (1980).

14. This assumption represents a compromise between (1) the view that pre-tax returns must be the same for both corporate and noncorporate activity because they both exist in the same market, and (2) the alternative view that corporate and noncorporate enterprises are essentially supplying different goods and services, and therefore before-tax returns need not be equalized. This latter view is consistent with the approach of Harberger (1962) to corporate income taxation. The need to modify the strict Harberger view has been suggested by Feldstein and Slemrod (1980) and Gravelle and Zimmerman (1984). Our approach equilibrates returns on corporate and noncorporate capital in a world with only one private sector output. The "efficiency differential" allows the marginal product of capital to be higher for corporate investments than for noncorporate investments, while at the same time after-tax returns at the margin for owners of equity claims in corporations and noncorporate enterprises are equalized. The differential could arise from limited liability, economics of large-scale capital accumulation, or other advantages of the corporate form. Further work will expand the model to allow for more than one business sector with corporations specializing in some activities, unincorporated business firms in others, and still more sectors containing both types of enterprises.

15. Our characterization of the net cost of capital is a simplified version of the approach developed by Hall and Jorgenson (1967).

16. Nonfilers were thus not considered explicitly, thereby introducing some degree of error into the estimates but probably of small magnitude, since total household wealth was not affected by this procedure but only its distribution.

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Comment Benjamin A. Okner

The Galper-Toder (G-T) paper is obviously an extremely ambitious undertaking. However, much work is still needed to improve and refine it. To their credit, the authors note several deficiencies and improvements that they feel are needed at several places within the paper.

In the model, the lack of any existence of risk is especially serious. Other changes they did not emphasize but that I believe would be fruitful include: splitting noncorporate business into a farm and nonfarm sector; separating proprietorships and partnerships; and developing a somewhat different approach to the demand for durable goods. I find it extremely unreal to think of grouping the things that influence the demand for automobiles or owner-occupied houses with the factors influencing the demand for toasters, vacuum cleaners, and hair dryers.

When they started to implement their model, the researchers obviously discovered that the data they needed do not exist. Lacking real data, G-T obviously did what other researchers have been doing for many years: they allocated aggregates among their population in accord with some proxy. This may have introduced two errors into their data base. The Federal Reserve Board aggregates for the household sector, in addition to being a not-too-reliable residual, also include data for schools, hospitals, and nonprofit institutions. Some adjustment should have been made to derive a number suitable for the universe of "people households." The other potential problem has to do with whether all of the aggregate asset values were distributed among the tax-filing population represented in the individual income tax file. For 1979, the CPS reports a total of 84.0 million families and unrelated individuals. The statistics in the paper indicate that there were 92.7 tax-filing units. While they may have adjusted for an alignment problem between the two data sets, the authors do not comment on this in the paper.

The exclusion of nonfilers may have had a deleterious effect on the G-T results. A large proportion of nonfilers are in the 65-and-over age groups and hold substantial amounts of assets. While I do not think that the omission of nontaxable nonfilers would influence any changes in the distribution of implicit and explicit transfers and taxes, they should have an effect on the initial yields of various types of assets. This again is an area worth looking into.

The lack of production functions and especially labor-supply functions is an extremely serious omission from the model. Without these, it is impossible to say anything serious about the incidence of any tax or

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The views expressed in this comment are those of the author only.

transfer changes. Since they did not have labor supply functions, the authors were forced into some very weak statements about "specific incidence" when, I believe, they should have been discussing "differential incidence."

In a differential incidence analysis, the 1979 distribution of income would probably appear much more progressive than the one that would be inferred from the paper. This occurs because the government would have to lower the tax on income from labor to "get rid of" the $45 billion raised by the explicit tax on income from capital (see table 3.7). And while wealth is concentrated among the rich, labor income accrues mainly to those at lower income levels. Of course, this need not occur if the government instead uses the money to increase spending on items that benefit only the rich. The "increased progression" results from the combination of a specific incidence analysis and a no-capital-income-tax economy used as the comparison case in the paper. In the future, I would strongly urge the authors to alter their model to include labor supply functions and to employ differential incidence and a comparison base that is either current tax law or some other tax structure that is more realistic than a no-tax world.

The counterfactual adopted (the no-tax-on-capital-income world) for the analysis not only contributes greatly to some extremely confusing wording, but is *unknown* and *unknowable*. Not only would the amount and allocation of capital be totally different if such a world existed, but it seems very likely that the same would be true of the amount and allocation of labor. It also seems likely that we would have different institutional arrangements (including forms of enterprise), laws, regulations (or lack thereof), and so forth. I do not know what my preferred comparison situation would be for this analysis (perhaps a graduated, two-step, equal-yield tax), but I feel confident that it would not be a *no-tax* world.

Careful reading leads me to question whether I would label the empirical work that was undertaken a "microsimulation." While the full tax file was used to derive average amounts and types of income for each of the 101 cells in the household sector, the calculations involved working with average or representative tax returns. For some analyses, the concept of an "average tax return" makes sense. For this one, I have grave doubts about the procedure. If there is such an entity as the "typical millionaire," I've never come across it. The people we are most interested in for wealth analysis are characterized by diversity and variation, yet that was all lost in creating 101 *average households*. A stratified sample of 10,000–20,000 returns in the household sector would have been far preferable and would not have used an enormous amount of computer space or time.

Finally, I think that it is appropriate to ask what was learned from the analysis. The major findings of the paper are that lower-wealth households received significant implicit transfers from the very rich and that when implicit taxes were added to their explicit tax burdens the richest of the rich were actually taxed more heavily than was generally thought. (Both conclusions, of course, depend on the model and the assumptions on which the model was formulated.)

This, of course, fails to convey the full richness of the results that can be derived from the G-T model. Yet a little thought makes it obvious that any progressive tax is going to yield a less-unequal after-tax distribution of income from wealth than will be the case in a no-tax world. And given a fixed total supply of wealth, a less-unequal wealth distribution must imply that there must be transfers occurring from the very rich to the less rich. It is not as obvious that one could deduce the magnitude of the additional implicit taxes imposed on the really, really rich. In an equal yield, differential analysis, such a tax increase would obviously be required, but that is not the case here. One would have to study the relationship between yields on tax-exempt and taxable bonds and recognize why tax-exempt bonds are attractive investments only for those in very high tax brackets to deduce this latter conclusion.

At this time, I find it impossible to give an overall evaluation of the Galper-Toder paper. Because so many important segments either need to be amplified or added to the model, any judgment at this point would be akin to asking an art critic to give his opinion of a canvas where the artist had run out of several colors of paint and where he also planned to enlarge the size of the total picture before he exhibited it.

The analysis represents a good start on what could turn out to be a very important tax policy tool in future years. The trick to success in building models of this kind seems to involve simultaneously formulating segments that are realistic (in the sense of having a recognizable counterpart in how people behave in the real world) and keeping the model simple enough to be comprehensible to other researchers (and policymakers).

Galper and Toder seem to have made a good start. I look forward to seeing their future work in this area.