UNIVERSIDADE NOVA DE LISBOA

Faculdade de Economia

ISSN 0871-2573

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Working Paper Nº 143

UNIVERSIDADE NOVA DE LISBOA
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PORTUGAL

Janeiro , 1990

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ABSTRACT

The objective of this paper is to compare the efficiency and distribution effects of integrating corporate and personal income taxes before and after the Tax Reform Act of 1986 (TRA86). This paper develops a dynamic general equilibrium model of the U.S. economy which accommodates optimal intertemporal investment decisions and optimal allocation of investment across sectors, intertemporal household consumption/leisure decisions, and government deficits and financial crowding out.

Simulation results concentrating on the inter-industry and intertemporal effects of integration suggest that efficiency gains under the TRA86, are much lower than under the previous tax law. The implication for policy is clear: the benefits from corporate tax integration may be too small to make the actual change desirable. From a different perspective simulation results suggest that the adoption of the TRA86 improved economic efficiency insofar as the corporate income tax is concerned.

THE TAX REFORM ACT OF 1986 AND THE EFFICIENCY EFFECTS OF CORPORATE TAX INTEGRATION

1. Introduction

The objective of this paper is to compare the efficiency and distribution effects of integrating corporate and personal income taxes before and after the Tax Reform Act of 1986 (TRA86). The corporate income tax has long been criticized for its distortionary effects on the economy. In particular, the corporate income tax introduces a differential among the rates of return of capital in different industries according to their degree of incorporation. Thus, the allocation of investment in the economy is distorted in favor of lowly incorporated sectors. Furthermore, the existence of differentiated investment tax credits and depreciation allowances creates a wide variety of marginal corporate taxes across incorporated industries. Finally, the corporate income tax represents a 'double' taxation of income at both the personal and corporate levels; corporate earnings are subject to the corporate tax, and the after-tax earnings are either distributed as dividends and taxed at the personal level or retained and potentially taxed as capital gains.

The issue of integrating the personal and corporate income taxes has some political clout. Integration was seriously suggested at least twice in the last decade. First, in 1977, full integration was advocated by a group of experts from the U.S. Treasury Department in "Blueprints for Basic Tax Reform," and was subsequently considered by the Carter administration. Also, in early 1983, the repeal of the corporate income tax was suggested in an offhand remark by President Reagan.

More recently, backdoor integration i.e., avoidance of the double taxation has known new highs. Corporate debt has increased relative to equity and the partnership sector has expanded relative to the corporate sector. In addition, the last substantial reform of the U.S. tax system, the TRA86,

addressed the distortionary of the corporate income tax in a very limited way. Therefore, it is likely that the issue of corporate tax integration will re-surface in the near future.

In the path-breaking work of Fullerton-King-Shoven-Whalley (1981, 1985), total integration was found to yield gains that could be as large as $695 billion of 1973 dollars, or about 1.4% of the present value of consumption and leisure in the U.S. economy. The gains reported by Fullerton-King-Shoven-Whalley result primarily from inter-industry reallocations of investment after accounting for the additional distortions in labor-leisure decisions. In turn, Pereira (1988b) discusses the intertemporal and inter-industry effects of interation under the pre-TRA 1986 tax regime in the context of a dynamic general equilibrium analysis. Simulation results suggest that the elimination of the corporate income tax and its replacement by increased personal income tax rates would yield long-run benefits which are at best .17% of the present value of future consumption and leisure. The fact that welfare gains from integration in this paper are much lower than those reported in Fullerton-King-Shoven-Whalley is to be attributed to the optimality of investment behavior with adjustment costs and imperfect capital mobilty.

The TRA86 changed the playing field for corporate tax integration. Statutory tax rates were decreased at both the personal and the corporate levels at the cost of broadening the respective tax bases. Ultimately it is expected that personal income tax revenues will decrease and the corporate tax revenues will increase by essentially the same amount. The gains from integration under the new tax regime may be lower or greater than under the previous tax regime. Lower distortions in the allocation of capital within the corporate sectors, together with lower distortions in terms of corporate dividend-retention decisions under the new tax law, have to be weighed against higher effective corporate tax rates and the necessity of higher personal income tax replacements.

This paper develops a dynamic general equilibrium model of the U.S. economy which accommodates optimal intertemporal investment decisions and optimal allocation of investment

across sectors, intertemporal household consumption/leisure decisions, and government deficits and financial crowding out. Simulation results concentrating on the inter-industry and intertemporal effects of integration suggest that efficiency gains under the TRA86 are much lower than under the previous tax law. This in turn, suggests that the change in tax regimes has improved economic efficiency. The implication for policy is clear: the benefits from corporate tax integration may be too small to make the actual change desirable.

This paper is organized as follows. Section 2 develops the dynamic general equilibrium model. It discusses the foundations of economic behavior as well as the nature of economic equilibrium. Section 3 and 4 present the design of the policy experiments and the empirical evidence on corporate tax integration under different policy scenarios, respectively. Finally, Section 5 summarizes the results in the paper and provides some concluding remarks.

2. A Dynamic General Equilibrium Model of the U.S. Economy

This section provides a description of the dynamic general equilibrium model in this paper. The first subsection gives a general overview of the model. Given the specific nature of this paper, focusing on corporate income tax integration, an in-depth description of producers' real and financial decision mechanisms is given in the second subsection. For a detailed description of this model see Pereira (1988a).

2.1 A General Overview

In this model the U.S. economy is characterized by an incomplete, sequential market structure in a finite horizon and discrete time frame. It is an incomplete market structure in that all current

markets are open, but there are no future markets. At any time, several markets are open for the different consumption goods, and for physical capital, labor and financial assets. In this economy there are three types of agents: consumer groups, industries, and government. Agents face a dynamic environment. Economic behavior of every agent in this economy is derived from an intertemporal specification of the agents' objectives and constraints.

The model considers four industrial sectors with different degrees of incorporation: sector one includes agriculture mining and energy; sector two includes food, textiles, paper, chemicals, lumber and metals; sector three includes trade, finance, real estate and services; and sector four includes capital goods such as construction, transportation and machinery. Industries maximize the present value of the net cash flow in a technology with adjustment costs, to determine endogenously optimal supplies and optimal demands for the different production inputs. In particular, investment decisions are forward looking. Real investment is financed by retained earnings and issuance of new debt and equity according to exogenously defined rules.

Government engages in several economic activities. First, it collects taxes - on the use of labor by the different industries, on both corporate and personal income including capital gains, and on sales - according to an exogenously given tax regime. The taxation system in the model reflects the situation in the United States after the TRA86. Second, it transfers discretionary lump-sum amounts to the private sector. Finally, it purcheses consumption goods and primary inputs to accomplish general government activities through the production of a public good. Government intertemporal behavior is obtained from the maximization of a social welfare function defined over the domain of the public good. General government activities are constrained by a recursive set of budget constraints so that government is allowed to run yearly deficits. Government engages in the sale of public bonds to finance such imbalances.

The model considers three income classes: lower class with yearly income below six thousand

of 1973 dollars; middle class with income between six and fifteen thousand of 1973 dollars; and upper class with income above fifteen thousand of 1973 dollars. Optimal household behavior follows a intertemporal optimization model generating endogenous savings and labor-leisure decisions. Household savings are invested in financial assets - public and private bonds, and equity. In the absence of uncertainty, the composition of the asset portfolio is a matter of indifference for the households. Portfolio decisions accommodate the composition of the demand for the funds households are supplying.

To make their real and financial decisions at each t, the economic agents use several types of information. They observe current prices. However, economic decisions are formulated in a context of imperfect information about future prices and interest rates. Intertemporal consistency is not imposed in the model, in that agents are allowed to commit mistakes due to incorrect expectations.

Atomistic competition in each and every market is assumed. Even though the number of agents on each side of the market is finite, it is assumed that enough agents are involved to render their actions negligible in terms of the overall equilibrium outcomes. The concept of Temporary Walrasian Equilibrium is adopted to capture the incomplete and sequential aspects of real world trading, and the limitations of foresight into the future which we want to capture in this model. All current markets are assumed to clear, hence the Walrasian nature of equilibrium. Also, equilibrium in the short-run is parametric on the expectations of future prices held by the different agents as well as future taxation parameters, hence the temporary or sequential nature of equilibrium. The link between adjacent periods is endogenously provided by the recursive transitions of the stock variables in the economy.

This model of the U.S. economy departs from Fullerton-King-Shoven-Whalley, and for that matter, from most of the numerical general equilibrium models for tax policy evaluation (see

Shoven-Whalley (1984) and Pereira-Shoven (1988) for surveys of these models), in several fundamental directions directly relevant for the issue of corporate tax integration. First, the model in this paper provides a comprehensive modeling of dynamic economic behavior. In particular, government deficits are optimally determined and investment decisions are forward looking and are the result of optimizing behavior. Secondly, it encompasses an endogenous sequential equilibrium structure founded on dynamic economic behavior with flexible expectations.

Given the temporary equilibrium structure of this model the computation of a t-dimensional intertemporal equilibrium path involves the computation of a sequence of t one-year equilibria parametrically on price expectations. The optimal transitions of the stock variables between adjacent one-year equilibria are determined endogenously given the equilibrium prices and net demands. For the simulation reported in this paper the DAGEM is run to produce a twenty-year equilibrium sequence in a decision time frame of one hundred years. Static expectations are maintained. This makes the results in this paper directly comparable to Fullerton-King-Shoven-Whalley. Also, short-run results refer to the first ten years and long-run to the whole twenty five year period.

2.2 Producers' Behavior

Production technology at each t is represented by a time-invariant Leontieff structure of the form:

$$(1)\quad y_{jt}=\text{Min}\{F_j(L_{jt},K_{jt}),y_{j1t}/a_{j1},\ldots,y_{jUt}/a_{jU}\},$$

The value-added production function, $VA_{jt}=F_j(L_{jt},K_{jt})$, is twice continuously differentiable, strictly increasing in every input, and concave.

We further assume that adjusting capital stock towards its optimal level is costly. This idea is

captured by sector-specific cost functions defined over gross capital stock accumulation. The adjustment cost functions can be interpreted to include both acquisition and internal, non-market adjustment costs. The twice continuously differentiable investment cost function for sector j is:

(2) $TC_j(I_{jt})=p_{It}I_{jt}+C_j(I_{jt})$,

The adjustment cost function has the following properties:

(3) $C_j(0)=0$, and $C_j(I_{jt})>0$ for $I_{jt}>0$,

(4) $\partial C_j(I_{jt})/\partial I_{jt}>0$ for $I_{jt}>0$,

(5) $\partial^2 C_j(I_{jt})/\partial I_{jt}^2>0$.

The evolution of capital stock through time, reflecting actual investment, is given by the equation of motion:

(6) $I_{jt}=K_{jt+1}-(1-\emptyset_{jt})K_{jt}$,

where $\emptyset_{jt}$ is the depreciation rate of capital stock installed in sector j at period t.

The equation of motion of capital reflects the idea that in the short-run, capital stock is fixed, i.e., the capital stock in existence at t is not a decision variable at t, but it is determined by optimal decisions in previous periods. However at t, investment decisions will be made determining the capital stock at t+1. In the long run, capital stock is variable.

Each sector of production j faces ad valorem taxes on the use of labor services, which represent the employer's portion of social security taxes. Therefore, if T_{Lt} is the tax rate, assumed constant across sectors of production, the cost for sector j of one unit of labor is given by $(1+T_{Lt})p_{Lt}$.

As a consequence of its decisions at period t, the sector realizes gross profits Π_{jt} - payment of capital services plus economic profits, i.e., sales revenues minus non-investment expenditures:

(7) $\Pi_{jt}=[p_{jt}-\Sigma_{1\leq f\leq J}(a_{jf}p_{ft})]y_{jt}-(1+T_{Lt})p_{Lt}L_{jt}$.

Each sector j is subject to an ad valorem corporate tax on Π_{jt}. The after-tax gross profits are $(1-T_{cjt})\Pi_{jt}$, where T_{cjt} is the sector-specific corporate tax rate at t.

On the other hand, investment expenditures benefit from an investment tax credit which is an ad valorem subsidy. Actual investment expenditures are $(1-ITC_{jt})p_{It}I_{jt}+C_j(I_{jt})$.

Interest payments are deductible from the corporate tax base so that the net interest paid on outstanding bonds is $(1-T_{cjt})r_tB_{jt}$.

Also, depreciation allowances DA_{jt} are to be deducted from the corporate tax base. Let $\emptyset'_{jt}$ and K'_{jt} be the depreciation rates for tax purposes and capital stock for tax purposes, respectively. The after-tax gross profits are increased by $T_{cjt}\emptyset'_{jt}K'_{jt}$.

Industry j's net cash flow at t NCF_{jt} can be written as:

(8) $NCF_{jt}=(1-T_{cjt})$

$\{[p_{jt}-\Sigma_f(a_{jf}p_{ft})]F_j(K_{jt},L_{jt})-(1+T_{Lt})p_{Lt}L_{jt}\}-(1-ITC_{jt})p_{It}I_{jt}+C_j(I_{jt})+T_{cjt}\emptyset'_{jt}K'_{jt}$.

The discounted value at t of the intertemporal sequence of net cash flows is obtained from the sequence of current and future expected market rates of return r_t's.

The producers' dynamic behavior with respect to real economic variables is determined by the maximization of the present value of net discounted cash flows at each moment z, subject to strictly convex adjustment costs, the equation of motion for the capital stock, and future price expectations. Formally, this is for $z\leq t\leq T$, $z\leq s\leq t$,

(9) $\text{Max}_{\{y,L,I,K\}}\Sigma_t[\Pi_s(1+r_s)^{-1}]NCF_{jt}$,

subject to:

i) non-negativity constraints for all $z \le t \le T$ and $1 \le f \le J$,

(10) $y_{jft} \ge 0, L_{jt} \ge 0, K_{jt} \ge 0$;

ii) equation of motion of capital stock for all $z \le t \le T$ as in (6),

iii) state end conditions,

(11) $K_{jz} = K^*_j$,

(12) scrap value of capital at $T+1$ is given.

Financing its real investment, production sector j is constrained in the following way for all $z \le t \le T$:

(13) $F^D_{jt} = (1-ITC_{jt})p_{It}I_{jt} + C_j(I_{jt}) + (1-T_{cjt})r_{Wt}B_{jt} - RE_{jt}$,

with terminal condition $FL_{jT+1} = 0$.

This means that real investment activities and the payment of interest on outstanding debt at t are financed through retained earnings, RE_{jt}, and external funds, F^D_{jt}, which represent the increment in the financial liabilities of the sector FL_{jt}. Financial liabilities must be liquidated by the end of the model horizon.

Dividend-retention policies are exogenously given. Corporate dividend-retention policies are represented by parameter $\emptyset_{\Pi jt}$, the fraction of the after-tax gross profits generated at t which is retained by industry j. The remainder, $(1-\emptyset_{\Pi jt})$, represents the distributed portion of after-tax earnings. Total dividends at t, $(1-\emptyset_{\Pi jt})(1-T_{cjt})\Pi_{jt}$, are distributed among the t-th period

shareholders.

External funds totalling F^D_{jt} are obtained by issuing additional equity E_{jt+1} at price p_{Ejt} and additional fixed price bonds ΔB_{jt}:

(14) $F^D_{jt}=\Delta B_{jt}+p_{Ejt}(E_{jt+1}-E_{jt})$.

Issuance of new bonds and equity is governed by exogenous corporate financing rules represented in this model by parameter ϕ_{Ejt}. Such policy rules can be described as follows:

(15) $p_{Ejt}(E_{jt+1}-E_{jt})=\phi_{Ejt}F_{jt}$,

(16) $\Delta B_{jt}=(1-\phi_{Ejt})F_{jt}$.

with end conditions,

(17) $p_{jEz-1}E_{jz}=p^*_{jEz-1}E^*_j$ and $p_{jET}E_{jT+1}=0$,

(18) $B_{jz}=B^*_j$ and $B_{jT+1}=0$.

Perfect capital markets are assumed such that the price of equity at z p_{Ejz} is the present discounted value of the future expected stream of dividends per share Div^e_{jt}/E_{jt}.

(19) $p_{jEz}=\Sigma_t[\Pi_{s\leq t}(1+r_s)^{-1}]Div^e_{jt}/E^e_{jt}$, with $z+1\leq t\leq T$.

3. Corporate Tax Integration: Simulation Design

Policy evaluations are carried out by contrasting a base case, reflecting the status quo, and several counterfactual, or revised case equilibria reflecting different policy scenarios. The different equilibria are made comparable by the use of the concept of equal yield (see Shoven-Whalley (1977)). In the revised cases, additional expenditures plus discretionary

transfers and interest payments on debt, may be financed via increased tax revenues - tax-financed experiments, new bond issuance - bond-financed experiments, or by a combination of both - mixed-financing experiments. The equal yield experiments involve endogenous replacement changes in the personal income tax rates. Replacements can be multiplicative (personal tax rates are multiplied by a certain factor) or additive (a certain factor is added to the personal tax rate). (See Pereira (1988c) for a detailed discussion of these points). Finally, the information contained in the different equilibria is synthesized in a scalar policy evaluation indicator, Hicksian Equivalent Variations generalized to accommodate intertemporal comparisons when perfect foresight is not assumed and future markets are not open.

3.1 Corporate Tax Integration Schemes

Several ways of dealing with the distortionary effects of the taxation of corporate income have either been suggested or implemented in the United States. Several laws for various periods attempted to alleviate the "double" taxation of dividends and the tax preference for bond financing. In 1936-1937, a dividend-paid deduction was in effect. The corporations were allowed to deduct dividends from the corporate tax base. More recently, during the planning that preceded the TRA86, the U.S. Treasury Department proposed that 10% of the dividends be deductible by corporations. A dividend-received credit for individuals was in effect in the U.S. from 1954 to1963. Households were allowed to deduct 4% of dividends received as a credit against their income tax. When this dividend credit was repealed in 1964, a dividend exclusion was introduced. A basic exclusion from the personal income tax of dividends under $100 ($200 for joint returns) was introduced. This dividend exclusion was eliminated with the Tax Reform Act of 1986.

All of the above methods provide only a partial integration of the personal and corporate income

taxes. Full integration would be a way of eliminating all the distortions generated by the corporate income taxation. One possibility is a full integration mechanism in the form of partnership. Corporations would be treated like partnerships, and corporate income would be taxed at the personal income level whether distributed or not. The partnership method raises several difficult problems. The most important problem stems from having to impute corporate income to stockholders. To avoid the possibility of an individual having to liquidate assets to pay taxes on earnings he or she did not receive, the corporate tax is kept as a withholding device. Under this full integration mechanism, corporations are treated the same way closely-held corporations are treated under the current tax law. Corporations impute retained earnings among the shareholders in order to withhold their income taxes. Shareholders, in turn, include both imputed and actual dividends in their tax base and would deduct the tax withheld by the firm from their tax payments.

An alternative approach of achieving full integration is to repeal the corporate income tax. All corporate income would be fully taxed at the personal income level. This form of full integration seems to have some political clout and has been occasionally suggested. In 1977, full integration was advocated by a group of experts from the U.S. Treasury Department in "Blueprints for Basic Tax Reform," and was subsequently considered by the Carter administration. Also, in early 1983, the repeal of the corporate income tax was suggested in an offhand remark by President Reagan.

In this paper, we focus on full integration achieved by repealing the corporate income tax. Under this full integration scheme the corporate income tax is eliminated and individuals pay income taxes on both corporate dividends and retained earnings.

3.2. The Two Institutional Settings

Two institutional settings are considered in this paper: before and after the TRA86. From the

standpoint of this paper, the two institutional settings differ in crucial aspects. Let us begin by reviewing some relevant differences for our analysis of the inter-industry and intertemporal effects of integration.

Before the TRA86, corporate income was subject to a progressive tax structure with a top rate of 46% for incomes above $100,000. Most of the corporations were actually in the highest echelon. A wedge was thereby introduced among industries depending on their degree of incorporation, which made investment conditions more favorable for the lowly incorporated industries.

Moreover, marked differential treatment of incorporated industries had been induced by special provisions such as the investment tax credit and the favorable treatment of depreciation allowances. The investment tax credit was first enacted in 1962 and was in effect through the end of 1985, except for two short periods. Under this provision, a variable share of expenditures in new investment could be credited against the corporate tax liability. Since the share of new investment allowed to be credited, depended on the type of capital, different sectors were differently affected by investment tax credit depending on the composition of their capital formation. Under the Accelerated Cost Recovery System of 1981, capital depreciation allowances were treated very favorably, permitting depreciation for tax purposes which exceeded the true economic depreciation. Because the tax advantage was related to the life of the physical asset, different corporate sectors were differently affected depending on the maturity of their capital. As a consequence of these provisions there has resulted marked differences in the effective tax rates within the corporate sectors, which has generated further distortions in the intersectorial allocation of capital.

The taxation of corporate capital has been seen as leading to the "double" taxation of income, in that corporate income is taxed both at the corporate and personal income levels. In fact, corporate earnings are subject to corporate income tax. After-tax earnings are either distributed as

dividends and taxed again at the personal income level, or retained by the corporation and potentially taxed as capital gains.

The TRA86 changes some important parameters in the analysis of corporate tax integration. First, the corporate tax rates diminish. The top corporate tax rate and the rate that most corporations face is now 34%. Inasmuch as the low statutory rate may be passed into a lower effective tax rate, the wedge between corporate and non-corporate sectors will also be reduced. In such a case, there are potentially lower gains to be derived from integration.

Secondly, the lower statutory tax rates go hand in hand with a broader corporate tax base. Investment tax credits were retroactively eliminated effective January 1, 1986, and depreciation allowances made far less favorable. These changes reduce the distortions in the allocation of capital across incorporated production sectors. Therefore, under the current tax code, the corporate industries are facing more uniform effective corporate tax rates. However, given the broader corporate tax base, the corporate industries may have to face higher effective corporate tax rates. Actually, the presumption is that effective corporate tax rates will increase. Lower intersectorial distortions go in the direction of lower efficiency gains from integration policies under the new tax law. On the other hand, higher effective corporate tax rates will widen the gap between the corporate and non-corporate industries and generate increased distortions. Higher effective corporate tax rates go in the direction of lower efficiency gains from integration policies under the new tax law.

From the above, it appears that gains from integration under the new tax regime may be lower or greater than under the previous tax regime. There are no a priori grounds for the results to go either way. Lower distortions in the allocation of capital within the corporate sectors, together with lower distortions in terms of corporate dividend-retention decisions under the new tax law, have to be weighed against higher effective corporate tax rates and the necessity of higher personal

income tax replacements.

4. Corporate Tax Integration Before and After the TRA86

In this section we concentrate on the comparison of the efficiency and distribution effects of integrating the corporate and personal income taxes before and after the TRA86.

PROPOSITION #1 - *The simulated efficiency gains from integration under the Tax Reform Act of 1986 are very low, still lower than the gains under the previous tax regime.*

The efficiency results of tax integration under the previous tax regime tax regime are reported in Table 1. The efficiency gains from such a radical measure as the elimination of the corporate income tax are at best very modest and often negative. Under the best scenario, the elimination of the corporate income tax under multiplicative replacement has long-run welfare effects which are positive but very low. The gains range from 55 to 58 billion of 1973 dollars or .158% to .165% of the present discounted value of intertemporal consumptiom and leisure (the adjusted GNP). On the other hand, the elimination of the corporate income tax under additive replacement has long-run welfare effects which are negative and range from -.098% to -.112% of the present value of the adjusted GNP.

The efficiency gains predicted by the model in this paper under the previous tax system are well below the estimates in the seminal work of Fullerton-King-Shoven-Whalley. The long-run gains from full integration simulated in this model are at least four-times lower than comparable results in Fullerton-King -Shoven-Whalley. This difference can be attributed to two factors. First, in the model in this paper, investment decisions are subject to rigidities: capital is not perfectly mobile across industries; installation of capital is costly; and, it takes time for capital to adjust to the optimal level. Therefore, lower efficiency gains are to be expected. Secondly, while

both models capture intertemporal consumption and labor-leisure decisions, the endogenously recursive nature of equilibrium in this paper better captures the intertemporal distortions induced by higher marginal income tax rates.

The efficiency results of tax integration under the TRA86 are reported in Table 2. The absolute efficiency gains from integration under the current tax system are still lower than under the previous tax regime. Long-run gains from full integration with tax-financed equal yield and multiplicative replacement are about .07% of the present discounted value of consumption plus leisure. Integration under bond-financed and mixed-financed equal yield generates long-run benefits which are slightly lower.

The differential in the efficiency benefits from integration under the previous and the current tax regimes can be attributed to several factors. First, the lower efficiency gains under the current tax law go hand-in-hand with systematically higher replacement rates. The need for higher tax replacements is justified by the higher corporate tax revenues generated under the new tax law, together with lower personal income tax revenue. Recall that one idea behind the TRA86 was to shift some of the tax revenues from the personal to the corporate income levels. In turn, higher replacement rates generate higher distortions in the intertemporal labor-leisure decisions. A second reason for smaller benefits under the TRA86 is that the government is simulated to optimally increase public deficits by about 20% as a consequence of the tax change. Financial crowding-out effects are therefore much higher under the new tax code than under the previous tax regime.

PROPOSITION #2 - *Results from integration follow a sharply increasing intertemporal pattern: long-run average gains are much larger than short-run average gains.*

Under the previous tax regime the intertemporal pattern of efficiency gains from integration is characterized by relatively small short-run gains followed by relatively large long-run gains.

Multiplicative replacement short-run average results are about .07%. of the adjusted GNP, while in the long-run welfare effects are about .165%. Therefore, average long-run benefits are more than twice as large as the average short-run benefits, which implies a sharply increasing efficiency pattern.

This intertemporal pattern is explained in part by the existence of adjustment costs. Since capital is not perfectly mobile across sectors and it takes time for capital to adjust towards the optimal levels, it also takes time for the investment efficiency effects to take place. The full benefits of integration on the allocation of capital will only be reaped in the long run.

Other important factors for the intertemporal pattern of efficiency gains are the distortions generated by the replacement mechanisms in the intertemporal labor-leisure decisions. In fact, for both bond-financed and mixed-financed equal yield and unlike tax-financed equal yield, the average long-run replacement is smaller than the average short-run replacement. In the two cases the intertemporal pattern is even more marked: average long-run benefits are about three times as large as the average short-run benefits.

Under the TRA86 this intertemporal pattern of efficiency gains is even more marked than under the previous tax law. In the short run the net efficiency gains from integration are virtually zero. Only in the long run, did the benefits become noticeable.

PROPOSITION #3 - *The TRA86 has brought forth a positive contribution to the reduction of the distortions of the corporate income tax.*

The difference in efficiency benefits from integration under the previous and current tax regimes provides an indication of the implicit value of the Tax Reform of 1986 in terms of corporate tax integration, i.e., in terms of the elimination of distortions associated with the corporate income tax. Recall that the gains from integration under the new tax regime might have been lower or greater than under the previous tax regime. Under the TRA86 there are lower

distortions in the allocation of capital among incorporated sectors. However, higher effective corporate tax rates and the necessity for higher personal income tax replacements work in the opposite direction. Simulation results suggest that insofar as corporate tax integration is concerned the TRA86 was a step in the right direction.

PROPOSITION #4 - *The absolute distributional effects of integration under the Tax Reform Act of 1986 are smaller than under the previous tax regime. However, the simulation results present the same general characteristics as under the previous tax regime.*

The distributional results of tax integration under the previous tax regime are reported in Tables 3-4. Intertemporal utility gains from integration are positively correlated with wealth. High income households benefit most from integration in terms of changes in intertemporal utility. They witness an increase of above 12% in the present value of their consumption and leisure. In turn, the lowest income class suffers a utility loss of about -6.5%. The intertemporal utility of the middle income group remains essentially unaltered. To summarize, integration is not Pareto improving in terms of its utility effects.

Wealth gains from integration are negatively correlated with wealth. Low income households benefit most from integration in terms of changes in wealth ownership. Their wealth increases about 7%. In turn, the highest income class group shows a wealth increase below 1%. It should be noticed that integration is Pareto improving from the standpoint of wealth accumulation.

Utility gains and wealth gains are negatively correlated. The highest income group shows the highest utility gains and the lowest wealth accumulation gains. Inversely, the lowest income group shows the lowest utility gains (actually a utility loss) and the highest wealth accumulation gains. Accordingly, in the model in this paper, the lowest income group behaves with the highest savings elasticity with respect to interest rates. The highest income group, in turn, prefers to use the additional available income to finance current consumption and leisure.

The distributional results of tax integration under the TRA86 are reported in Tables 6-7. The effects of integration on the intertemporal utility value of consumption and leisure show the same pattern as under the previous tax law. Intertemporal utility gains from integration are positively correlated with wealth. However, the effects are now smaller in absolute value. The lowest income class loses about 3.5%, while the highest income class gains about 10.5%. Also, the effects of integration on the wealth accumulation show the same pattern as under the previous tax law. Wealth gains from integration are negatively correlated with wealth. The effects are again smaller in absolute value. The lowest income class shows a 4.5% increase in wealth accumulation, while the gains for the other two income groups are negligible.

PROPOSITION #5 - *Integration induces small changes in the private capital formation. The highly incorporated sectors gain the most with tax integration.*

The effects of tax integration on capital formation under the previous tax regime are reported in Table 5. Integration induces small changes in the private capital formation. Sector 1 (the primary sector essentially) which is lowly integrated shows a decrease in the capital stock. On the other hand, the other three sectors which have relatively high degrees of incorporation show increased capital stock. The elimination of the corporate income tax eliminates the wedge in price of capital for the corporate sector. Therefore, integration induces a reallocation of investment in the economy in favor of the corporate sectors. The sector with the highest degree of incorporation - Sector 3 (manufacturing sector essentially) gains the most with tax integration in terms of capital accumulation - about a 1% increase.

It should be noted that the gains in capital accumulation are relatively small when compared with FKSW. That has to do with the modeling in this paper of an investment behavior induced by adjustment costs. Capital is not fully mobile intersectorially and it takes time for capital to adjust to its optimal levels.

The effects of tax integration on capital formation under the TRA86 are reported in Table 8. Integration under the new tax law induces even smaller changes in the private capital formation. Still, the highly incorporated sectors gain most with tax integration. In turn, the unincorporated (essentially agricultural) sector witnesses a decrease in capital formation.

5. Concluding Remarks

The objective of this paper is to compare the efficiency and distribution effects of integrating corporate and personal income taxes before and after the TRA86. This paper develops a dynamic general equilibrium model of the U.S. economy which accommodates optimal intertemporal investment decisions and optimal allocation of investment across sectors, intertemporal household consumption/leisure decisions, and government deficits and financial crowding out. Simulation results concentrating on the inter-industry and intertemporal effects of integration suggest that efficiency gains under the TRA86 are much lower than under the previous tax law. This in turn suggests, that so far as the corporate income tax in concerned, the change in tax regimes has improved economic efficiency.

The results in this paper are important for the policy debate on tax integration. The major implication for policy is clear: the benefits from corporate tax integration under the TRA86 may be too small when compared to the costs of implementation and compliance to make the actual change in the tax code desirable. If however, the goal of corporate tax integration is to be pursued, in the near future under the TRA86 tax system, political difficulties should be expected in the short-run when the efficiency gains from integration are not yet apparent.

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TABLE 3
Intertemporal Utility Changes Under the Previous Tax Law
Revised Case/Base Case

FULL INTEGRATION With Multiplicative Replacement	LOW INCOME GROUP	MEDIUM INCOME GROUP	HIGH INCOME GROUP
Bond Financing	0.92854	1.00988	1.1126
Tax Financing	0.94057	1.00991	1.11227
Mixed Financing	0.93782	1.00982	1.11209

TABLE 4
Wealth Accumulation Changes Under the Previous Tax Law
Revised Case/Base Case

FULL INTEGRATION With Multiplicative Replacement	LOW INCOME GROUP	MEDIUM INCOME GROUP	HIGH INCOME GROUP
Bond Financing	1.07159	1.01291	1.00877
Tax Financing	1.07077	1.01282	1.00874
Mixed Financing	1.07094	1.01288	1.00879

TABLE 5
Changes in Capital Accumulation Under the Previous Tax Law
Revised Case/Base Case

FULL INTEGRATION With Multiplicative Replacement	SECTOR 1 Agriculture	SECTOR 2 Manufacturing	SECTOR 3 Services	SECTOR 4 Capital
Bond Financing	0.99998	1.00949	1.00145	1.00034
Tax Financing	0.99998	1.00951	1.00146	1.00034
Mixed Financing	0.99998	1.00951	1.00146	1.00034

FULL INTEGRATION	EQUIVALENT VARIATIONS (Billions of 1973 Dollars)		TAX REPLACEMENT FACTOR		GNP	DEFICITS
	Short-Run	Long-Run	Short-Run	Long-Run	Revised Case/Base Case	Revised Case/Base Case
Bond Financing						
Multiplicative Replacement	10.195	55.475	1.125	1.121	0.99881	0.99976
Additive Replacement	-34.545	-39.060	.028	.027	0.99893	0.99936
Tax Financing						
Multiplicative Replacement	12.650	57.675	1.117	1.121	0.99876	1.0 by definition
Additive Replacement	-28.010	-34.585	.025	.026	0.99887	1.0 by definition
Mixed Financing						
Multiplicative Replacement	11.111	56.345	1.122	1.121	0.99879	0.99995
Additive Replacement	-32.210	-37.100	.027	0.026	0.99891	0.99969

NB = Base Case Adjusted GNP is 34991.575 billion 1973 dollars.

TABLE 2
Efficiency Effects of Full Integration Under the TRA86

FULL INTEGRATION	EQUIVALENT VARIATIONS (Billions of 1973 Dollars)		TAX REPLACEMENT FACTOR		GNP	DEFICITS
	Short-Run	Long-Run	Short-Run	Long-Run	Revised Case/Base Case	Revised Case/Base Case
Bond Financing						
Multiplicative Replacement	-1.245	25.470	1.230	1.218	0.99872	1.00113
Additive Replacement	-55.060	-84.800	.029	.028	0.99896	1.00032
Tax Financing						
Multiplicative Replacement	-.285	25.505	1.226	1.225	0.99874	1.0 by definition
Additive Replacement	-49.905	-84.730	.028	.028	0.99895	1.0 by definition
Mixed Financing						
Multiplicative Replacement	-.975	25.055	1.229	1.221	0.99873	1.00091
Additive Replacement	-53.730	-84.405	.029	0.027	0.99895	1.00030

NB = Base Case Adjusted GNP is 34146.57a billion 1973 dollars.

TABLE 6
Intertemporal Utility Changes Under the TRA86
Revised Case/Base Case

FULL INTEGRATION With Multiplicative Replacement	LOW INCOME GROUP	MEDIUM INCOME GROUP	HIGH INCOME GROUP
Bond Financing	0.96554	1.00575	1.10798
Tax Financing	0.96643	1.00541	1.10439
Mixed Financing	0.96535	1.00553	1.10510

TABLE 7
Wealth Accumulation Changes Under the TRA86
Revised Case/Base Case

FULL INTEGRATION With Multiplicative Replacement	LOW INCOME GROUP	MEDIUM INCOME GROUP	HIGH INCOME GROUP
Bond Financing	1.04567	1.00701	0.99967
Tax Financing	1.04521	1.00739	1.00035
Mixed Financing	1.04524	1.00731	1.00118

TABLE 8
Changes in Capital Accumulation Under the TRA86
Revised Case/Base Case

FULL INTEGRATION With Multiplicative Replacement	SECTOR 1 Agriculture	SECTOR 2 Manufacturing	SECTOR 3 Services	SECTOR 4 Capital
Bond Financing	0.99998	1.00626	1.00095	1.00036
Tax Financing	0.99998	1.00626	1.00095	1.00037
Mixed Financing	0.99998	1.00626	1.00096	1.00037