Integration and Investment Incentives

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Comment

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Integration of corporate and individual taxes reduces the effective tax rate on the earnings of capital and, therefore, promotes investment. Since integration operates only on the earnings of equity, it alters the optimal allocation of corporate liabilities in the direction of more equity financing and less debt. The earnings of equity may be divided into dividends, retained taxed earnings, and other retained earnings that are not included in taxable income because of inaccuracies [1] in tax accounting. Integration will alter the relative rates of taxation of the components of the income of equity, creating an incentive for an increase in the proportion of the earnings of equity that are paid out. It will also reduce the relative value of investments that promise a high proportion of their returns in capital gains that escape corporate taxes.

This paper develops the theoretical foundations of these effects and offers estimates of the magnitudes of the incentive effects in a disequilibrium context—assuming no behavioral responses. The methodology of the paper is to consider an economy with two assets, a $1 structure and a $1 item of equipment. The required rate of return for each item of capital is computed from a variety of assumed parameters dealing with characteristics of assets, the tax system, and investors. Two of the parameters are the returns that investors require, after all taxes, on debt and on equity. The difference between the return that the asset earns and the return that investors receive is what the Government receives. The Government return, as a fraction of the total return on an asset, is a

[1] Tax accounting does not measure income accurately; for example, depreciation for tax purposes does not correspond to economic depreciation.

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measure of the overall tax rate on the income from capital. Since the tax rate on debt and the proportion of debt in the capital structure are assumed to be known, the effective tax rate on equity can be calculated as a residual. Then, since the dividend rate and the tax rates on dividends and on retained (taxed) earnings are assumed to be known, it is possible to determine whether an assumed value for the proportion of the earnings of equity that are capital gains not taxed at the corporate level is consistent, and to search for a value that is consistent.

The Required Rate of Return

When markets are in equilibrium, the present value of the return to a $1 investment, P, net of the present value of corporate taxes, U, will equal the cost of the investment, $1, net of the investment tax credit, k, that the Government pays. Thus

$$P-U=1-k. \tag{1}$$

Recognizing that taxes are levied at a rate of u on a base of the return to capital less interest and depreciation, equation (1) may be rewritten as

$$P-u(P-I-Z)=1-k, \tag{2}$$

where I is the present value of interest payments and Z is the present value of the depreciation allowed for tax purposes. Solving equation (2) for P,

$$P=\frac{1-k-u(Z+I)}{1-u}. \tag{3}$$

Letting p be the annual rental price of the services of the asset, and defining $Y=P/p$, where Y may be interpreted as the present equivalent of the years of service an asset will deliver, the rental price of the services of the asset is given by

$$p=\frac{1-k-u(Z+I)}{Y(1-u)}. \tag{4}$$

If f is the fraction of corporate liabilities that are debt, r_d is the market interest rate on debt, and r_e is the return to equity (dividends plus anticipated capital gain) the market requires, then the discount rate at which the present values in equation (4) must be evaluated is

$$R=fr_d+(1-f)r_e, \tag{5}$$

a weighted average of the rates that must be paid to the holders of debt and equity. However, the present value of interest payments cannot easily be calculated except in an indirect way. Since interest payments are deductible from taxable income, the Government, in effect, pays the proportion u of interest and the firm pays the proportion $(1-u)$. The equilibrium that results is the same as that which would occur if the return on debt were $r_d(1-u)$ and interest were not deductible. Therefore, the price of the services of an asset may also be expressed as

$$p=\frac{1-k-uZ^*}{Y^*(1-u)}, \tag{6}$$

where the asterisks indicate that the present values are calculated at a discount rate of

$$R^*=fr_d(1-u)+(1-f)r_e, \tag{7}$$

which reflects the deductibility of interest.

Now the present value of interest payments may be calculated by equating equations (4) and (6), yielding

$$I=\frac{Y^*(1-k-uZ)-Y(1-k-uZ^*)}{uY^*}. \tag{8}$$

In the special case of an asset with a service flow that depreciates exponentially at a rate of δ, as is assumed for equipment, and with exponential price inflation at a rate of i,

$$Y=\int_0^{\infty} e^{-(R-i+\delta)t}dt=\frac{1}{R-i+\delta}. \tag{9}$$

The present value of depreciation allowances for equipment is calculated using the formula

$$Z=\frac{2[L(e^R-1)-1+e^{-LR}]}{L(L+1)R(e^R-1)}, \tag{10}$$

where L is the life assigned to the asset for tax purposes. This represents sum-of-the-years-digits depreciation, under an assumption that each year's depreciation is taken continuously throughout the year. The pattern of partial payment dates for corporate taxes makes this not a bad assumption.

The values of Y^* and Z^* can be calculated from equations (9) and (10), using R^* rather than R, so that I can then be calculated from equation (4). The real rate of return, ρ, an item of equipment yields is the value of ρ that is a solution of

$$\int_0^{\infty} pe^{-(\rho+\delta)t}dt=1, \tag{11}$$

namely

$$\rho = p - \delta = \frac{(R-i+\delta)(1-k-uZ-uI)}{1-u} - \delta. \tag{12}$$

Structures provide a pattern of services more like a "one-hoss shay." In this case

$$Y = \int_0^\Lambda e^{-(R-i)t}dt = \frac{1-e^{-(R-i)\Lambda}}{\mathrm{R}-i}, \tag{13}$$

where Λ is the economic life of a structure. The present value of the depreciation allowances on a structure is calculated using 150 percent declining-balance depreciation, with a switch to straight-line after S years, where $S=\Lambda/3$, rounded up to an integer. The formula is

$$Z = \frac{1.5(e^R-1)[1-(X/e^R)^S]}{L'R(e^R-X)} + \frac{\mathrm{X}^S(e^{-SR}-e^{-L'R})}{(L'-S)R}, \tag{14}$$

where L' is the life assigned to a structure for tax purposes and X is the value left after one year of such depreciation, namely $1-(1.5/L')$. This formula again assumes that each year's depreciation is taken continuously.

The required real return for a "one-hoss shay" with a constant real price is the ρ that is a solution of

$$\int_0^\Lambda pe^{-\rho t}dt = 1, \tag{15}$$

or

$$\frac{\rho}{1-e^{-\rho\Lambda}} = p. \tag{16}$$

Substituting from equations (13) and (16) into equation (4) yields

$$\frac{\rho}{1-e^{-\rho\Lambda}} = \frac{(R-i)(1-uZ-uI)}{(1-u)(1-e^{-(R-i)\Lambda})} \tag{17}$$

as an implicit equation for the required real return on structures.

Parameters of Present Institutions

Table 1 shows the values of a number of parameters that are assumed for the analysis that follows. They are based on some combination of published statistics, the author's judgment, and Office of Tax Analysis studies. To my knowledge, the conclusions

TABLE 1.—*Parameters assumed to be unaffected by integration*

L	Tax life of equipment: 12 years
δ	Depreciation rate of equipment: 18% per year
L'	Tax life of structures: 30 years
Λ	Economic life of structures: 30 years
f_d	Fraction of interest income that is taxed: 40%
f_e	Fraction of equity income that is taxed: 75%
M_d	Average marginal tax rate of interest recipients: 12% (This is 30% for the 40% that is taxed, and 0 for the other 60%.)
M_e	Average marginal tax rate of equity owners: 30% (This is 40% for the 75% that is taxed, and 0 for the other 25%.)
f_g	Effective average marginal tax rate on capital gains (taking account of deferral as well as exclusion) as a fraction of M_e: 25%
i	Inflation rate: 6%
r_{da}	Real return to debt after taxes: 3%
r_{ea}	Real return to equity after all taxes: 8%
v	The dividend rate: 4%
f	The fraction of corporate capital that is debt: 40%
P_e	Proportion of producers' capital that is equipment: 50%
M_g	Effective average marginal tax rate on capital gains: $M_e \times f_g$, or 7.5%
r_{ca}	Real return after all taxes on the weighted average of debt and equity in a firm: $fr_{da}+(1-f)r_{ea}$, or 6%

of the paper would be substantially the same if any combination of the parameters were changed up or down by up to 15 percent.

The assumption in table 1—that there are real returns to debt and equity that will be unaffected by integration—reflects the disequilibrium nature of the analysis. Under this assumption, changes in required real rates of return on equipment and structure can be calculated. The magnitudes of these changes measure the impact of integration. In the movement to equilibrium, the real returns would rise to equate the supply and demand for investment funds, but no effort is made here to estimate the magnitude of those increases or to estimate the increase in investment in equilibrium.

Another important assumption implicit in table 1 is that the distribution of marginal tax rates is unimportant; it is assumed that the investment process will work as if all participants had the average marginal tax rate. This is unrealistic, but a very complex model would be needed to avoid this simplification.

Table 2 shows parameters that do not depend on the characteristics of assets, for present institutions and five integration options. The five options are: (1) full integration; (2) full integration with 48 percent withholding at the corporate level; (3)

TABLE 2.—*Parameters of alternative schemes not dependent on asset characteristics*

	Present institutions	Full integration option #1	Integration option #2 [1]	Integration option #3 [2]	Integration option #4 [3]	Integration option #5 [4]
I_d	0.1200	0.1200	0.1200	0.1200	—0.0375	0.0435
I_w	0.0750	0.0000	—0.1154	0.0750	0.0750	0.0750
I_v	0.3000	0.0000	—0.1154	—0.1154	0.0469	0.0123
u	0.4800	0.3000	0.4800	0.4800	0.3600	0.3900
k	0.1000	0.0290	0.0410	0.0500	0.0400	0.0430
r_d	0.1023	0.1023	0.1023	0.1023	0.0867	0.0941
ρ	1.0000	1.0000	1.0000	1.0000	0.0000	0.3623
r_{db}	0.0123	0.1023	0.1023	0.1023	0.1355	0.1325
u_d	0.0000	0.0000	0.0000	0.0000	0.3600	0.2896
N_d	0.1200	0.1200	0.1200	0.1200	0.3360	0.3205
T_d	0.2903	0.2903	0.2903	0.2903	0.6029	0.5859

[1] Integration with 48% withholding.

[2] 48% corporation income tax; gross-up and credit for dividends.

[3] 33% corporation income tax with interest not deductible; gross-up and credit for interest and dividends.

[4] 37% corporation income tax with only the excess of interest over inflation deductible, and only that portion taxable as individual income. Gross-up and credit for dividends.

integration of dividends only, with withholding at 48 percent; (4) treating interest and dividends the same way, with both subject to withholding, and the tax rate on retained earnings (and the withholding rate) reduced to 36 percent to keep the overall tax rate constant; (5) indexation of interest (so that only the excess over the inflation rate would be deductible from corporate income and taxable as individual income), combined with integration of dividends only, and a withholding and corporate tax rate of 39 percent.

The parameters are calculated as follows: I_d, the individual tax rate on interest, is M_d unless interest is taxed at the corporate level. In option 4, the individual rate is calculated as $(M_d - uf_d)/(1-u)$, an estimate of the underwithholding from taxed recipients of interest as a fraction of interest received. For option 5, I_d is calculated as M_d multiplied by the proportion of interest that is taxable at the individual level.

Under present institutions or options 3, 4, and 5, where retained earnings are not integrated, I_w, the individual tax rate on retained earnings, is M_g, the marginal tax rate on capital gains. Under full integration, I_w is M_e, and under scheme 3, I_w is $(M_e - uf_e)/(1-u)$, the estimated underwithholding as a proportion of earnings after corporate taxes allocated to individuals. Similarly, I_v, the individual tax rate on dividends, is M_e under present institutions or full integration, and $(M_e - uf_e)/(1-u)$ under the other schemes, where dividends are integrated by withholding.

The corporate tax rate, u, is a policy parameter. The values for options 4 and 5 were chosen to produce the effective real tax rate on structures (40 percent) that present institutions produce for a representative combination of structures and equipment. The investment tax credit, k, is also a policy parameter. The values illustrated, except for present institutions, were chosen to yield required returns to equipment equal to the corresponding required returns on structures.

A brief digression: The present, step-function investment tax credit provides different stimuli for assets of different tax lives. This distortion could be eliminated while a uniform tax credit is maintained (assuming no distortions from inflation or inappropriate tax lives) by reducing allowed depreciation in each year to the fraction $\frac{u-k}{u}$ of what would be appropriate in the absence of a tax credit. The distortion from inflation can be eliminated by raising depreciation allowances in each year by the ratio of price level at the time the depreciation is taken to price level at the time of purchase. For an asset with service that decays exponentially at a rate of δ, inflation-adjusted economic depreciation has a present value of $\delta/(R^*-i+\delta)$. Adding the adjustment for the investment tax credit, the required rate of return for any asset will be

$$\frac{(R^*-i+\delta)\left(1-k-u\dfrac{u-k}{u}\dfrac{\delta}{R^*-i+\delta}\right)}{1-u}-\delta$$

$$=\frac{(R^*-i+\delta)(1-k)-(u-k)\delta-\delta(1-u)}{1-u}$$

$$=\frac{(R^*-i)(1-k)+\delta-\delta k-u\delta+k\delta-\delta+u\delta}{1-u}$$

$$=(R^*-i)\frac{1-k}{1-u},$$

which is independent of δ.

This is a variation on a point made by Harberger—that neutrality can be achieved by permitting investors to expense some portion, x, of investment and to depreciate the portion $1-x$ in the pattern of economic depreciation. Expensing the portion x is equivalent to taking a tax credit of ux.

Yet another way of achieving neutrality is to vary the amount of the investment tax credit with economic depreciation. In particular, an investment tax credit of $x/(R^*-i+\delta)$ is neutral. End of digression.

The market return to debt, r_d, is calculated as $(r_{da}+i)/(1-I_d)$. The proportion of interest that is deductible for corporations, α, is 1 for the first three options, 0 for option 4, and $(r_d-i)/r_d$ for option 5.

The nominal return to debt before taxes, r_{db}, is calculated as $r_d[\alpha+(1-\alpha)/(1-u)]$. The effective corporate tax rate on debt, $\hat{u}_d$, is then calculated as $(r_{db}-r_d)/r_{db}$. The nominal tax rate on debt, combining corporate and individual taxes, N_d, is calculated as $(r_{db}-r_{da}-i)/r_{db}$, while the real or true tax rate on debt T_d, combining corporate and individual taxes, is calculated as $(r_{db}-r_{da}-i)/(r_{db}-i)$.

Table 3 shows parameters of alternative integration schemes that may be affected by asset characteristics. Two basic assets are considered: (a) a structure with a 30-year tax life, a 30-year economic life, and a flow of services like a "one-hoss shay," and (b) an equipment asset with a 12-year tax life and an 18 percent, exponential decay of services. The equipment is analyzed with and without an investment tax credit. Two combinations of assets are analyzed as well. Each combination is composed of structures and equipment in equal proportions. However, the equipment in the first combination receives an investment tax credit while the equipment in the second combination does not.

The market return to equity, r_e, is calculated to be that that yields a real return of r_{ea} after all taxes. The equation used is

$$r_e = \frac{r_{ea}+i-v(1-I_v)-g(1-I_g)}{1-I_w}+v+g.$$

The required rates of return for equipment and structures (the ρ's) are calculated by equations (12) and (17) respectively. The nominal tax rate on debt and equity combined, N_c, is calculated as $(\rho-r_{ca})/(\rho+i)$. The real or true tax rate on debt and equity combined, T_c, is calculated as $(\rho-r_{ca})/\rho$.

The nominal return to equity before taxes, r_{eb}, can be calculated from the fact that the nominal return on an asset, $\rho+i$, is a weighted average of the nominal return to debt before taxes, r_{db}, and the nominal return to equity before taxes, r_{eb}. The resulting formula is

$$r_{eb}=(\rho+i-fr_{db})/(1-f).$$

The nominal tax rate on equity, N_e, may then be calculated as $(r_{eb}-i-r_{ea})/r_{eb}$. The real or true tax rate on equity, T_e, is calculated as $(r_{eb}-i-r_{ea})/(r_{eb}-i)$.

To calculate the effective rate of the corporation income tax on equity (taking account of the investment tax credit) one must know the present value of the tax base without an investment tax credit, π. This may be calculated as $pY-Z-I$, where I is calculated from equation (8). The effective tax rate with an investment tax credit, $\hat{u}_e$, is then calculated as $u[(\pi-k)/\pi]$.

The nominal tax rate on retained earnings, N_w, is $I_w+\hat{u}_e-I_w\hat{u}_e$. Similarly, the nominal tax rate on dividends, N_v, is $I_v+\hat{u}_e-I_v\hat{u}_e$.

With this information, the implied rate of capital gain not accounted for by retained earnings, g, can be computed as $[r_{eb}N_e-(vN_v+wN_w)/(1-\hat{u}_e)]/I_g$. This formula comes from the fact that nominal tax rate on equity must be an appropriate weighted average of the nominal tax rates on dividends, retained earnings, and other capital gains. The computer program used for this work started with an assumed value of g and then searched for a value that, when assumed, satisfied the check condition above. The whole set of relationships was checked by setting tax depreciation equal to economic depreciation for equipment, namely

TABLE 3.—*Parameters of alternative integration schemes that may depend on asset characteristics*

	(a) Struc.	(b) Equip. w/ITC[1]	(c) Avg. of (a) and (b)	(d) Equip. w/o ITC	(e) Avg. of (a) and (d)	(a) Struc.	(b) Equip. w/ITC	(c) Avg. of (a) and (b)	(d) Equip. w/o ITC	(e) Avg. of (a) and (d)
	Present institutions					Full integration				
r_e	0.1611	0.1611	0.1611	0.1611	0.1611	0.1472	0.1464	0.1468	0.1442	0.1457
ρ	0.1104	0.0897	0.1000	0.1355	0.1229	0.0823	0.0822	0.0822	0.0901	0.0862
N_c	0.2957	0.1984	0.2502	0.3860	0.3439	0.1567	0.1559	0.1563	0.2007	0.1793
T_c	0.4564	0.3311	0.4002	0.5570	0.5118	0.2710	0.2697	0.2704	0.3343	0.3041
r_{eb}	0.2158	0.1813	0.1985	0.2576	0.2367	0.1690	0.1688	0.1689	0.1820	0.1755
N_e	0.3512	0.2279	0.2949	0.4565	0.4085	0.1715	0.1704	0.1710	0.2310	0.2024
T_e	0.4864	0.3406	0.4226	0.5951	0.5472	0.2660	0.2644	0.2652	0.3445	0.3075
u_e	0.4800	0.3234	0.4320	0.4800	0.4800	0.3000	0.2685	0.2880	0.3000	0.3000
N_w	0.5190	0.3742	0.4746	0.5190	0.5190	0.3000	0.2685	0.2880	0.3000	0.3000
N_v	0.6360	0.5264	0.6024	0.6360	0.6360	0.3000	0.2685	0.2880	0.3000	0.3000
g	0.1018	0.1188	0.1103	0.0566	0.0792	0.0965	0.0856	0.0910	0.0559	0.0762
G_{e0}	0.0497	0.0286	0.0392	0.0763	0.0630	0.0243	0.0248	0.0246	0.0345	0.0294
G_{d0}	0.0007	—0.0205	—0.0099	0.0272	0.0139	—0.0063	—0.0059	—0.0061	0.0038	—0.0013
G_{e4}	0.0779	0.0567	0.0673	0.1044	0.0911	0.0543	0.0577	0.0560	0.0754	0.0648
G_{d4}	0.0416	0.0204	0.0310	0.0681	0.0548	0.0346	0.0350	0.0348	0.0447	0.0396
r_e	0.1413	0.1376	0.1395	0.1344	0.1379	0.1431	0.1431	0.1431	0.1431	0.1431
ρ	0.0927	0.0927	0.0927	0.1071	0.0999	0.0942	0.0944	0.0943	0.1163	0.1052
N_c	0.2139	0.2142	0.2141	0.2817	0.2493	0.2219	0.2229	0.2224	0.3192	0.2738
T_c	0.3524	0.3529	0.3527	0.4396	0.3992	0.3633	0.3646	0.3639	0.4839	0.4299
r_{eb}	0.1862	0.1864	0.1863	0.2103	0.1982	0.1889	0.1892	0.1890	0.2256	0.2072
N_e	0.2483	0.2487	0.2485	0.3342	0.2938	0.2587	0.2600	0.2594	0.3794	0.3244
T_e	0.3663	0.3668	0.3666	0.4676	0.4213	0.3792	0.3807	0.3800	0.5169	0.4566
u_e	0.4800	0.4214	0.4592	0.4800	0.4800	0.4800	0.4089	0.4549	0.4800	0.4800

N_w	0.4200	0.3547	0.3438	0.4200	0.3646	0.5190	0.4532	0.4958	0.5190	0.5190
N_v	0.4200	0.3547	0.3438	0.4200	0.3646	0.4200	0.3407	0.3395	0.4200	0.3646
g	0.0927	0.0706	0.0816	0.0523	0.0725	0.0936	0.0765	0.0850	0.0538	0.0737
G_{e0}	0.0437	0.0467	0.0452	0.0637	0.0537	0.0442	0.0449	0.0445	0.0677	0.0560
G_{d0}	—0.0054	—0.0024	—0.0039	0.0146	0.0046	—0.0049	—0.0042	—0.0045	0.0186	0.0069
G_{e4}	0.0454	0.0434	0.0444	0.0563	0.0508	0.0483	0.0491	0.0487	0.0719	0.0601
G_{d4}	0.0355	0.0385	0.0370	0.0555	0.0455	0.0360	0.0367	0.0364	0.0595	0.0478
r_e	0.1501	0.1501	0.1501	0.1501	0.1501	0.1486	0.1486	0.1486	0.1486	0.1486
ρ	0.1000	0.1000	0.1000	0.1153	0.1077	0.1002	0.1002	0.1002	0.1172	0.1087
N_c	0.2499	0.2502	0.2500	0.3156	0.2842	0.2509	0.2508	0.2508	0.3227	0.2886
T_c	0.3998	0.4002	0.4000	0.4798	0.4427	0.4011	0.4010	0.4010	0.4880	0.4480
r_{eb}	0.1763	0.1764	0.1763	0.2019	0.1891	0.1787	0.1786	0.1787	0.2070	0.1928
N_e	0.2057	0.2062	0.2060	0.3065	0.2595	0.2165	0.2163	0.2164	0.3237	0.2740
T_e	0.3118	0.3126	0.3122	0.4361	0.3801	0.3259	0.3257	0.3258	0.4558	0.3978
u_e	0.3600	0.3224	0.3473	0.3600	0.3600	0.3900	0.3446	0.3744	0.3900	0.3900
N_w	0.4080	0.3732	0.3963	0.4080	0.4080	0.4357	0.3937	0.4213	0.4357	0.4357
N_v	0.3900	0.3541	0.3942	0.3900	0.4069	0.3975	0.3526	0.3867	0.3975	0.4023
g	0.1037	0.0950	0.0993	0.0582	0.0809	0.1017	0.0916	0.0966	0.0573	0.0795
G_{e0}	0.0352	0.0353	0.0352	0.0506	0.0429	0.0380	0.0381	0.0381	0.0554	0.0467
G_{d0}	0.0352	0.0353	0.0352	0.0506	0.0429	0.0247	0.0248	0.0248	0.0421	0.0334
G_{e4}	0.0487	0.0488	0.0487	0.0641	0.0564	0.0495	0.0497	0.0496	0.0669	0.0582
G_{d4}	0.0406	0.0407	0.0406	0.0560	0.0483	0.0383	0.0385	0.0384	0.0557	0.0470

[1] ITC=investment tax credit.

[2] Integration with 48% witholding.

[3] 48% corporation income tax; gross-up and credit for dividends.

[4] 36% corporation income tax with interest not deductible; gross-up and credit for interest and dividends.

[5] 39% corporation income tax with only the excess of interest over inflation deductible, and only that portion taxable as individual income. Gross-up and credit for dividends.

$\delta/(R-i+\delta)$, setting the rate of inflation equal to zero, and seeing that the computed value of g was zero, as it ought to be.

The marginal Government receipts from $1 of tax-exempt funds invested in equity, in present value terms, is $u(pY-Z)-k$. To turn this into a rate of return, one can divide it by

$$Y_t=(pY-1)/\rho-i-R),$$

which is the ratio of the Government receipts to its rate of return. Thus the Government's rate of return on a marginal dollar of tax-exempt funds invested in equity, G_{eo}, is calculated as $[u(pY-Z)-k]/Y_t$. The Government's rate of return on a marginal dollar of tax-exempt funds invested in debt, G_{do}, can then be calculated as $G_{eo}-ur_d\alpha$. The Government's rate of return on funds of an individual with a 40 percent marginal tax rate, invested in debt or in equity, G_{e4} and G_{d4}, can then be calculated by adding appropriate individual taxes to G_{e0} and G_{d0} respectively.

The averages in table 3 [columns (c) and (e)] are calculated assuming that the proportion p_e of the value of capital is equipment and the remainder is structures. This means that all rates of return, r_e, ρ, r_{eb}, g, G_{e0}, G_{d0}, G_{e4}, and G_{d4}, are computed as p_e times the number applicable to equipment plus $1-p_e$ times the number applicable to structures. The tax rates are then computed by the same formulas used to compute them for equipment and structures separately.

Important Differences Among Integration Schemes

An important virtue of integration is that it reduces the discrimination against equity financing. Under present institutions, the real tax rate on equity, combining equipment and structures, is 42.3 percent compared with 29.0 percent for debt. Full integration combined with elimination of the investment tax credit leaves the rate on debt unchanged and reduces the rate of equity to 26.5 percent. However, full integration would eliminate the substantial taxes that tax-exempt entities now pay on their equity holdings. This revenue loss can be avoided by adopting option 2, which, through its withholding feature, provides that nonfiling entities such as tax-exempt organizations and foreigners would be taxed on their retained earnings and dividends at the withholding rate.

A feature of option 2 that is likely to generate political opposition is its treatment of retained earning as income of shareholders. Many people believe that retained earnings are not income of shareholders, and they will oppose this feature even though it reduces taxes for anyone whose marginal tax rate is less than $4u/(u+3)$, about 55 percent when $u=48$ percent. Option 3 avoids this difficulty by preserving the double taxation of retained earnings (taxed first as corporate income, then as capital gains).

There is a significant distortion that is not removed by option 3. That is the fact that the debt holdings of tax-exempt entities effectively escape taxation. This shows up in the fact that G_{d0} is much smaller than G_{e0}, G_{d4} or G_{e4}. This distortion increases the reliance on debt financing, which increases the risk of bankruptcy, and motivates individuals to hold an inefficient proportion of their wealth as life insurance and pension rights. The distortion can be eliminated by eliminating the deductibility of interest. To avoid increasing the tax burden on capital, the corporation tax rate can be reduced at the same time, as in option 4. The corporation tax rate shown there, 36 percent, produces the same true tax rate on structures, namely 40 percent, as present institutions produce for the capital stock as a whole. When an investment tax credit of 4 percent is employed, the effective tax rates on equipment and on structures are equated as well.

The biggest problem with option 4 is that tax-exempt entities will oppose the increase in the levies on their capital earnings. This might be handled by permitting tax-exempt entities to file for partial or total refunds (and raising taxes on other owners of capital); another compromise that might be considered is option 5. This reduces taxes on debt by providing that only the excess of interest above inflation is deductible at the corporate level, and only that portion is taxable at the individual level. This is an indexation feature. The nondeductibility of the portion of interest corresponding to inflation is justified by the fact that such a payment, in term of "real accounting," is a return of capital rather than interest. It might be considered rather strange to adopt only this feature of indexation, but it would mean that the portion of the interest income of tax-exempt entities that was real interest would be untaxed, thereby reducing the effective tax rate on such entities. At the same time, it would preserve some of the discrimination of present institutions in favor of debt finance.

It may seem that options 4 and 5 would discriminate against debt finance, since the tax rates on debt that are shown are so much higher than those on equity. However, the appropriate test of nondiscrimination is whether a shift between debt and equity finance (to which investors, at the margin, would be indifferent) changes Government revenue. Any change in Government revenue from a marginal change in financing indicates a distortion from taxation, since it indicates a hypothetical possibility of increasing Government revenue (by a marginal change in financing) without making investors worse off.

The paradox is resolved when it is understood that if investors are indifferent between a return of 3 percent on debt or 8 percent on equity, then the two returns have equal utility value (because of the security of debt returns and the inaccessibility of unrealized capital gains).

Conclusion

The taxation of capital introduces many opportunities for distortions—between saving and consumption, corporate and noncorporate activity, dividends and retained earnings, debt and equity financing, individual and institutional financing, and among types of assets. The distortions among assets types can be avoided by making tax depreciation equal to economic depreciation, or by other manipulations of depreciation rates and the investment tax credit. Elimination of the distortion in favor of debt requires that the deductibility of interest be eliminated.

The discrimination against dividends is removed by full integration or option 2, while options 3, 4, and 5 involve discrimination in favor of dividends for taxpayers with marginal tax rates below approximately 55 percent when the corporate tax rate is 48 percent, and slight discrimination against dividends for taxpayers with marginal rates above that level. Similarly, full integration and option 2 generate no distortion with respect to decisions between corporate and noncorporate forms of organization, while options 3, 4, and 5 discriminate against corporate activity for taxpayers with low marginal tax rates and promote corporate organization for individuals with high marginal tax rates.

The only way to tax capital without distorting saving-consumption decisions would be to impose a never-to-be-repeated capital levy that would be believed to be just that—one time only; it would be difficult to create such a belief. If one accepts the saving-consumption distortion, the simplest tax that eliminates all other distortions is a property tax. While the schemes described in this paper differ considerably in the extent to which they approximate full neutrality, none comes as close to full neutrality as a property tax.

References

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COMMENT

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The paper "Integration and Investment Incentives" raises some interesting and important issues. However, the basic evaluation model used in estimating the values of different tax variables under various integration schemes is marred at the theoretical level because of the basic evaluation model used and its implications for the discount rates for bonds and stocks. The problem is discussed below. Without redoing the author's complete analysis, it is difficult to assess the sensitivity of his results to this theoretical defect.

Potentially the most useful analyses Tideman carries out are those that estimate the total taxes paid by both corporations and investors as a group on income generated by specific kinds of investments. It is, of course, this total which should be of prime concern to an investor—not how this total is split between the corporate and investor level.

Too often, one hears the cry of "double taxation" in support of a reduction in the tax rate on dividends paid by corporations. There is nothing inherently wrong with taxing income at two or more levels: it happens all the time. Nonetheless, proponents of a reduction of taxes on dividends have sometimes tried to justify such a reduction by appealing to the supposed unfairness of a double tax. Now, it may well be that the total taxes on income generated through equity investment should be reduced, but not for reasons of double taxation. The principal concern should be the total taxes paid and not how these taxes are allocated between corporations and investors. While Tideman does provide such an allocation, his main analyses are based—as they should be—upon total taxes.

In examining the question of neutrality, Tideman employs an interesting construct. This construct is the total tax generated by a one dollar investment—what he calls the Government's rate of return on a marginal investment dollar. This rate of return would, of course, vary according to whether the investment dollar was placed in debt or equity and whether the investor was tax-exempt or taxable and if taxable, at what rate. Using an average marginal rate for taxable investors, Tideman calculates these Government rates of return for tax-exempt investors in both bonds and equities and for taxable investors in both bonds and stocks.

Tideman's estimates indicate that the equity holdings of tax-exempt investors are implicitly taxed, the reason being their share of the corporate tax. Thus, a legitimate concern in any reform of the tax system is the impact on taxes paid implicitly by tax-exempt institutions.

While it is probably preferable to consider both corporate and investor taxes together as here, one could go a step farther (theoretically, at least) by adjusting for the participants' abilities to shift the tax burden to other participants. For example, if a corporation (or a tax-exempt institution) could pass its tax burden to consumers through higher prices, the effective tax rate borne by capital would be reduced. Such tax rates, fully adjusted for the incidence of the tax system, would give a fairer assessment of any tax reform; but in practice, such adjusted rates would be quite tenuous and thus probably not as useful as Tideman's combined rates.

Tideman argues that neutrality requires that any marginal shift of corporate financing between debt and equity should involve no change in Government revenue. This condition would be satisfied if the Government's rate of return on a marginal investment dollar were the same for all sources of financing and it would produce neutrality in a world of uncertainty in which both debt and equity would by default have the same risk characteristics and thus be perfect substitutes. In a world of uncertainty, there is no generally accepted concept of neutrality because most of the work on neutrality was done before the development of modern risk theory.

For instance, one could mean by neutrality that a change in tax policy would not affect the proportions that investors place in bonds and stocks. If all investors had utility functions displaying constant absolute risk aversion, Tideman's condition would probably produce neutrality. If, however, as seems more likely, investors have utility functions displaying constant proportional risk aversion,[1] Tideman's condition would not lead to neutrality. Obviously, more work needs to be done on the concept of neutrality in a world of uncertainty. Until such a theory is developed, equity and the impact on incentives may be the best operational criteria in evaluating different tax schemes.

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[1] Irwin Friend and Marshall E. Blume, "The Demand for Risky Assets," *American Economic Review* (December 1975).

Tideman's model is marred by a theoretical defect in that his model discounts all after-tax cash outflows of a corporation at the same rate and assumes that all such flows are of the same risk. Until it is determined how sensitive his numerical estimates are to this flaw, how much confidence can be placed in these estimates, presented in his tables 2 and 3, is not known.

Specifically, his model appears to discount all corporate after-tax cash flows at the same rate, a weighted average of the cost of debt and equity capital. Thus, at least in one case ($\delta=0$, $i=0$), the value of debt is determined as the value of the debt payments discounted by this weighted average cost of capital. Bond values in the market, however, are determined by the value of the coupons and principal discounted at a rate appropriate to bonds, which would generally be closer to the long term Government rate than this weighted average cost of capital. Tideman's value of debt therefore appears to be understated and the value of equity overstated.

Moreover, the financial literature has usually treated the deductibility of interest as equivalent to a tax scheme in which the Government taxed a firm's cash flow as if there were no deductions and then gave the firm a subsidy equal to the product of the tax rate and the interest payments. The risk associated with this subsidy is generally considered to be low, so that this subsidy should be discounted at something close to the long-term Government rate. The use of debt thus increases the value of the firm, so that for this reason, Tideman's estimate of the value of equity would be understated. The determination of the size of this understatement relative to the previously mentioned overstatement would require further study of a nature not appropriate to a comment. The same argument could presumably be applied to depreciation expense.