Volume Title: Tax Policy and the Economy, Volume 3

Volume Author/Editor: Lawrence H. Summers, editor

Volume Publisher: MIT Press

Volume ISBN: 0-262-06126-0

Volume URL: http://www.nber.org/books/summ89-1

Conference Date: November 15, 1988

Publication Date: 1989

Chapter Title: Incentive Effects of the Corporate Alternative Minimum Tax

Chapter Author: B. Douglas Bernheim

Chapter URL: http://www.nber.org/chapters/c10946

Chapter pages in book: (p. 69 - 96)

INCENTIVE EFFECTS OF THE CORPORATE ALTERNATIVE MINIMUM TAX

B. Douglas Bernheim
Northwestern University and NBER

1. INTRODUCTION

The Tax Reform Act (TRA) of 1986 embraced fundamental and far-reaching changes to the U.S. system of personal and corporate income taxation. These changes were motivated by a desire to reduce the distortionary impact of taxation on economic activity and to promote a more equitable distribution of the tax burden. Accordingly, the legislation implemented lower marginal tax rates and "leveled the playing field" by eliminating the special treatment of many items.

One significant portion of the TRA amended the U.S. system of alternative minimum taxes (henceforth AMTs), which limit the extent to which individuals and corporations can reduce tax liabilities through the use of preference items. The new base for the corporate AMT consists of taxable income plus a variety of preference items, including (most notably) the difference between normal and accelerated depreciation allowances on real property and one-half of the difference between taxable income and book income (to be replaced by earnings and profits after 1989). Corporations pay the maximum of their conventional and AMT liabilities, where the latter is calculated by applying a specified tax sched-

This research was sponsored in part by the Center for Economic Policy Research at Stanford University. It was presented at the NBER conference "Tax Policy and the Economy" held in Washington, D.C., on 15 November 1988. Opinions expressed here are those of the author and should not be attributed to any other individual or organization.

ule to the AMT base. When corporate income is sufficiently high, the AMT is simply 20 percent of the corresponding base, compared to 34 percent for the regular corporate income tax. Since the AMT employs a larger base and a lower rate, it may be either higher or lower than the conventional tax and is more likely to come into play for companies that make greater use of preference items.

The inclusion of these AMT provisions in the 1986 Act was primarily motivated by Congress's desire to make the federal income tax system more equitable—or, at very least, to make it appear more equitable. Policymakers were particularly eager to eliminate the spectacle of companies with large book earnings paying little or no income taxes. As a secondary matter, Congress also anticipated that these provisions would raise a significant amount of revenue. In particular, forecasts place AMT collections at about $5.3 billion in fiscal 1988, up from only $500 million per year under prior law. Some studies (for example, Lucke, Eisenach, and Dildine; 1986) suggest that the longer-run impact of the AMT on corporate tax liabilities will be much more modest, primarily due to provisions that allow corporations to credit AMT payments against future regular tax liabilities. More realistic simulations (Dworin, 1987a and 1987b) contradict this conclusion.

Aside from promoting equity while preserving revenues, the TRA of 1986 was also intended to reduce the distortionary impact of taxes on economic activity. Yet, to date, the impact of the AMT on incentives and behavior has received very little attention. One important exception is a study by Graetz and Sunley (1986). Their analysis supported an unequivocal conclusion: "If only efficiency considerations were relevant, the minimum tax would likely be condemned by all."

The Graetz-Sunley argument follows from the observation that the AMT affects average and marginal tax rates very differently. In particular, it represents an attempt to "level the playing field" by distributing the tax burden more equally. This amounts to a partial equalization of *average* tax rates. Yet *marginal* tax rates are the key determinants of investment incentives. Moreover, the marginal tax rates associated with the AMT and the conventional tax appear to be quite different. Consequently, the effective marginal tax rate for any given firm may depend to a great extent on the firm's exposure to the AMT. Since this exposure differs across firms, the AMT may significantly distort the allocation of capital.

This paper challenges the Graetz-Sunley view. I argue that the AMT not only levels the playing field in terms of average tax rates (as was intended) but also rather fortuitously tends to equalize marginal tax rates. Overall, its impact should be to reduce the distortionary impact of corporate taxation on investment.

In section 2, I consider the impact of the AMT on economic activity within firms and conclude that minimum tax provisions promote more uniform effective tax rates over different types of physical capital investments, other inputs, and sources of finance. In the absence of an AMT, the current tax system would heavily favor debt finance, and would impose the lowest effective burden on assets falling into the seven-year-life Accelerated Cost Recovery System (ACRS) category. When a company is exposed to the AMT, these advantages and the resulting distortions of real and financial decisions may be significantly smaller. In particular, the AMT reduces the effective tax rate on equity-financed investments and reduces the effective tax subsidy to debt-financed investments. The convergence between effective tax rates is susbstantial.

In section 3, I consider the impact of the AMT on the distribution of capital and economic activity across firms. Using firm-level data from Standard and Poor's *Compustat* file, I show that the incidence of the AMT is likely to be very uneven. Differences in exposure to the AMT are systematic, so that some industries will ordinarily incur much larger AMT liabilities than others. This is hardly surprising, since minimum tax provisions are intended to compensate for the excessive use of preference items by certain firms and industries. Unfortunately, it also raises the possibility that, as argued by Graetz and Sunley, the AMT could significantly distort the allocation of capital across firms. Yet, my analysis indicates that such concerns are groundless. If firms used only a single source of funds (either debt, equity, or retained earnings) to finance investments, then the AMT would indeed create very uneven incentives. However, since the AMT tends to reduce both the next tax burden on equity and the net tax subsidy to debt, its effect on the *weighted average* cost of capital for a typical firm is minimal. In addition, it will also tend to raise effective tax rates on firms for which these rates are low (for example, those relying disproportionately on debt capital) and to reduce effective tax rates on firms for which these rates are high (for example, those relying disproportionately on equity capital). Thus, while the burden of the AMT is very uneven across firms, its impact on marginal tax rates is not—indeed, it may actually compress the range of prevailing rates. Consequently, the AMT may well improve the allocation of capital across firms and industries.

Aside from investment, the AMT might also distort the organization of economic activity by promoting otherwise unprofitable mergers and leases, which essentially allow firms to trade tax preferences. Previous research strongly suggests that the impact on merger activity will be small. Unfortunately, existing studies tell us little if anything about the likely impact on leasing. While anecdotal evidence suggests that the

AMT has encouraged leasing in some specific cases, I argue that the aggregate impact on leasing will be minimal. I support this argument with empirical analysis. Using a sample of firms drawn from the Compustat file, I study the relationship between exposure to the AMT and leasing activity subsequent to the TRA of 1986. While it is still too soon to reach any definite conclusions, I am unable to find any evidence supporting the view that exposure to the AMT encourages leasing.

In summary, I find that the AMT reduces the distortionary impact of corporate taxation on decisions taken within firms and on the allocation of capital across firms. It is also likely that adverse effects on leasing and merger activity will be small. Overall, the AMT should have a positive impact on economic incentives

2. THE IMPACT OF THE AMT ON ECONOMIC ACTIVITY WITHIN FIRMS

In exploring the effects of the AMT on capital budgeting and financial structure, I will focus on provisions relating to the treatment of depreciation. The Tax Reform Act of 1986 modified the ACRS to provide for a variety of asset classes. For three-, five-, seven-, and ten-year assets, the system prescribes the 200 percent declining balance method, switching to the straight-line method at a point to maximize deductions. Fifteen- and twenty-year assets receive similar treatment, except that the 150 percent declining balance method is employed initially. For residential rental and nonresidential real property, the straight-line method is used. To determine AMTI (alternative minimum taxable income), firms recalculate depreciation allowances as follows. For three-, five-, seven-, ten-, fifteen-, and twenty-year property, the recalculation is based on the 150 percent declining balance—switching to straight-line method, using the asset's class life, rather than its ACRS recovery period, as its service life. AMT depreciation for residential rental and nonresidential real property is based on the straight-line method, assuming forty-year service lives. The difference between ACRS and AMT depreciation is then added to taxable income.

In this section, I modify the methodology of King and Fullerton (1984) in order to calculate effective tax rates on assets in each of the relevant ACRS categories under the current tax law both with and without the AMT provisions. In principle, this is a very different calculation since firms typically do not know in advance whether regular or alternative tax provisions will apply, and since the relevant provisions may change with the firm's performance during the productive life of the asset in question. Two assumptions render the problem tractable. First, I assume

that investors are risk-neutral, so that I do not have to consider the effect of alternative minimum taxation on risk premiums. Second, I assume that firms are not permitted to carry forward or backward any excess taxes paid under the AMT. For this second assumption, one may also substitute (with some reinterpretation of parameters) the supposition that firms can carry AMT tax liabilities forward or backward without limitation at the market rate of interest. In practice, investors are risk-averse, and firms have some limited ability to carry forward excess AMT payments as credits against future regular tax liabilities. Accordingly, these calculations should be regarded as a first pass at the issue of investment incentives, rather than the final word.

The King-Fullerton methodology presupposes that investors require some rate of return, ρ, before personal taxes (this might, for example, be the interest rate available on bonds of comparable quality). Corporate investments must provide this required rate of return after meeting corporate tax liabilties. Thus, corporations must earn some other rate of return, p, before corporate taxes. The rate p is often referred to as the "cost of capital." In the appendix to this paper, I derive an expression for p under an income tax system that includes AMT provisions. In the absence of personal and corporate taxes, p would simply equal r, the real rate of return available on other investments. The difference between p and r reflects the burden of corporate taxation on corporate investment. Thus, it is appropriate to define the effective tax rate, T, as follows:

$$T = \frac{p - r}{r}.$$

Note that T measures the effective rate of *corporate* taxation. It does not reflect the wedge induced by the personal tax system and therefore should not be interpreted as a comprehensive measure of the tax burden on capital income.

To calculate the cost of capital and the effective tax rate, one must specify the characteristics of the tax system and the investment in question. Throughout, I will assume that the regular corporate tax rate, τ, is 0.34, and that the Alternative Minimum Tax rate, τ^*, is 0.20. For the purpose of making illustrative calculations, I will assume that the company in question has a 20 percent probability of incurring AMT liabilities in any given year (in the notation of the Appendix, $\phi = 0.2$). This falls within the range of probabilities calculated by Dworin (1987a), who simulated the tax experience of "representative" companies under the new tax law. I will take the real market rate of return, r, to be 5 percent, and the rate of inflation, π, to be 3 percent (so that the nominal market rate of

return, i, is 8 percent). I calculate the present value of depreciation allowances (henceforth denoted D) by applying the actual depreciation rules for each of the seven ACRS asset categories. For residential rental and nonresidential real property, I use service lives of 27.5 and 31.5 years, respectively. To calculate the present value of depreciation allowances under the AMT system (henceforth denoted D^*), I use the midpoint of the class life range for each ACRS category (for example, seven-year property corresponds to assets with class lives between ten and sixteen years; I use thirteen). True economic depreciation (denoted δ in the Appendix) is very difficult to measure. For the purpose of making illustrative calculations, I take δ to be the inverse of the assumed class life for each asset category.

As in King and Fullerton's analysis, the cost of capital and the effective tax rate depend critically on the source of financing for the investment in question. In the next three subsections, I present calculations for three different sources of funds: new equity issues, retained earnings, and debt.

2.1 Equity Finance

Above, I have identified types of investments by two parameters: D, the value of depreciation allowances per dollar of investment under the regular tax provisions, and D^*, the value of allowances under the AMT provisions. In general, both D and D^* lie between zero and one (that is, firms receive positive deductions, but these deductions are not as favorable as immediate expensing). Since ACRS allows accelerated depreciation, we always have $D > D^*$. The difference between these two terms represents the tax preference, P, for a particular investment (that is, $P = D - D^*$).

As it turns out, the impact of the AMT on effective tax rates depends critically on both the base level of depreciation allowances, D^*, and the level of tax preference, P. Using the expressions derived in the Appendix, one can show that the AMT does not alter effective tax rates whenever

$$P = \gamma (1 - D^*), \tag{1}$$

where

$$\gamma = \left[\frac{\tau - \tau^*}{(1 - \tau^*)\tau} \right].$$

Whenever the preference level is greater than that given by equation (1), the AMT raises the effective tax rate. However, whenever the prefer-

ence level is less than that given by equation (1), the AMT actually *reduces* the effective tax rate. Indeed, as long as preference levels are not too high, the AMT could theoretically reduce effective rates across the board in all investment categories, despite the fact that it increases revenues. The tax rate on preference items may even fall relative to that on some nonpreference items. To see how this may occur, consider two investments, one of which is depreciated and the other of which is expensed. Suppose that the AMT regulations entail slower depreciation for the first asset but still allow expensing of the second asset (so that the second, though expensed, is not a preference item). For the expensed asset, we have $P = 0$ and $D^* = 1$. Equation (1) then implies that the AMT does alter the effective tax rate on this asset. Yet, as I have already argued, the AMT may reduce the tax rate on the asset that receives preferential treatment under the ordinary tax system.

These conclusions may at first seem surprising. After all, the AMT is supposed to represent an additional tax on preference items. The explanation for this puzzle is that the AMT imposes a large *inframarginal* tax burden, since it is applied to a base that exceeds regular taxable income. The effective tax rates discussed throughout this paper are *marginal* tax rates (this is appropriate, since only marginal rates affect incentives). By imposing a lower statutory rate (τ^* rather than τ), the AMT tends to reduce the fraction of each incremental dollar that the corporation pays to the government, even though it raises taxes as a fraction of ordinary taxable income. As long as the level of tax preference is not too high, this effect will dominate. For assets with very large tax preferences, the lower statutory rate is more than offset by the loss of incremental depreciation allowances, and so the AMT raises the effective tax rate.

One interesting feature of equation (1) is that it does not contain ϕ, the probability that a firm will incur AMT liabilities. Thus, if the AMT raises (or lowers) the effective tax rate on a particular type of asset, it will do so for all firms. While the *magnitude* of the effect of the AMT on the cost of capital depends upon the firm's characteristics, the *direction* of this effect does not.

Another important conclusion following from equation (1) is that the creation of an AMT may compress the range of effective tax rates on assets of different types. This would contribute to efficiency by reducing distortions between various categories of investments. Suppose, in particular, that we fix the base level of depreciation allowances, D^*, and vary the level of tax preference, P. Higher values of P imply that the asset is taxed at a lower rate under the ordinary corporate income tax. Equation (1) implies that the AMT raises tax rates on assets with higher values of P and lowers tax rates on assets with lower values of P. Thus,

the AMT tends to equalize effective tax rates for assets with similar values of D^*.

Similarly, one can hold the level of tax preference fixed at some level P and compare tax rates across assets that are depreciated differently under AMT regulations. A very similar picture emerges. For fixed P, the effective tax rate is a decreasing function of the AMT depreciation allowances, D^*. Equation (1) implies that for low values of D^* the AMT reduces the effective tax rate, and for high values of D^* the AMT increases the effective tax rate. Thus, the introduction of an AMT tends to equalize effective tax rates across different classes of assets.

Despite these observations, it is not the case that an AMT necessarily reduces the differences in tax rates between all categories of investments. Consider, for example, two investments, one of which is depreciated and the other of which is expensed. Suppose, as in our earlier example, that AMT regulations entail slower depreciation of the first asset but still permit expensing of the second. In the absence of an AMT, the effective tax rate on the depreciated asset is higher. The imposition of an AMT does not affect the tax rate on the expensed investment. Yet it is possible that the effective tax rate on the depreciated asset will rise, thereby creating an even larger gap between the rates imposed on these two investments.

The key issue of whether the AMT raises or lowers effective tax rates on investments that receive accelerated depreciation, and the associated question of whether the AMT compresses the range of effective tax rates, can only be resolved in the context of a particular tax system. Accordingly, I now turn my attention to calculations based on the current (1988) U.S. tax law. Substitution of the relevant values for τ and τ^* reveal that $\gamma = 0.515$. Using this formula, it is possible to determine whether the AMT increases or decreases the effective tax rates on different categories of assets, by computing actual preference levels and comparing them with the corresponding break-even levels—that is, the levels of P described by equation (1). The results of these calculations are contained in Table 1. Note that in every category, the actual preference is less than the break-even preference level. Thus, the current AMT *reduces* effective marginal tax rates on all classes of equity-financed investments that receive preferential treatment under ACRS.

To assess the magnitude of this reduction, I calculate effective tax rates for each asset category based on current law with and without AMT provisions. The results are contained in Table 2. This table explicitly confirms the finding that the AMT reduces effective tax rates on tax-preferred investment categories. The decline in rates ranges from 0.3 percentage points (for seven-year assets), to more than 5 percentage points (for residential rental property). In most cases, there is roughly an

TABLE 1
ACRS and Break-Even Preferences for Equity Finance

Asset category	AMT depreciation	ACRS preference	Break-even preference
3-year 200 percent	0.898	0.025	0.053
5-year, 200 percent	0.785	0.084	0.111
7-year, 200 percent	0.651	0.169	0.180
10-year, 200 percent	0.565	0.188	0.224
15-year, 150 percent	0.502	0.113	0.256
20-year, 150 percent	0.444	0.091	0.286
Residential	0.300	0.065	0.360
Nonresidential	0.300	0.104	0.360

8 to 10 percent decline in the effective rate subsequent to the introduction of the AMT. The impact of the AMT on incentives is therefore potentially large.

These calculations also illustrate a significant compression of the range of effective tax rates. In the absence of an AMT, the difference between the highest and lowest tax rate is 25.5 percentage points; with an AMT, this difference is only 20.5 percentage points. Furthermore, tax rates converge for every pair of asset categories, with only one exception (rates for five- and ten-year assets diverge slightly). Finally, bear in mind that some inputs (labor, advertising, and so on) are expensed and that the effective tax rate on an expensed input is zero. Since the AMT reduces tax rates on depreciable investments, there is therefore also compression of tax rates among a wider class of inputs.

TABLE 2
Effective Tax Rates with Equity Finance

Asset category	Effective tax rate without AMT (percent)	Effective tax rate with AMT (percent)
3-year, 200 percent	30.5	27.9
5-year, 200 percent	26.1	24.8
7-year, 200 percent	23.6	23.3
10-year, 200 percent	26.9	26.0
15-year, 150 percent	37.5	34.3
20-year, 150 percent	41.4	37.3
Residential	46.0	41.4
Nonresidential	49.1	43.8

Two central conclusions emerge from this analysis. First, the AMT reduces effective tax rates on equity-financed depreciable investments and may thereby reduce adverse investment incentives created by the corporate tax system. Second, the AMT causes compression of the range of effective tax rates on productive inputs, thereby reducing the distortionary effect of the corporate tax system on the choice of inputs.

2.2 *Internal Finance*

When a corporation reinvests earnings, shareholders can defer realization of those earnings into the future. This deferral lowers the effective tax rate on investment income. Thus, shareholders may well demand a lower rate of return, after corporate tax (but before personal tax), on internally financed investments than on equity-financed investments. In terms of my notation, ρ may be lower with internal finance (see King and Fullerton for a more complete discussion). It is therefore necessary to recalculate the cost of capital and the effective tax rate for each class of investment.

In spite of this consideration, the qualitative analyses of effective tax rates under new equity and internal finance are extremely similar. In particular, equation (1) continues to define the break-even tax preference level for which the AMT leaves effective tax rates unchanged. Of course, since the source of finance determines the firm's discount rate, ρ, it also affects the present discounted value of depreciation allowances (D and D^*). It is therefore at least theoretically possible that, for some asset category, the AMT lowers the effective tax rate when the investment is financed with new equity and raises the effective tax rate when it is financed with retained earnings.

Once again, these issues can only be resolved within the context of a particular tax system. Actual calculations of effective tax rates on internally financed investments require knowledge about personal, as well as corporate, tax rates. Under the current tax laws, marginal personal tax rates are either 15, 28, or 33 percent. One would expect corporate stockholders to be concentrated among the relatively wealthy, so that an appropriate weighted average of these rates would produce a number near the top end of the range. On the other hand, various kinds of nontaxed institutions (especially pension funds) hold a significant fraction of corporate equity. For illustrative purposes, I assume that the effective personal tax rate on ordinary income (denoted m in the Appendix) is 0.25. As information becomes available from tax returns in 1988 and later, it will be appropriate to refine this number. While the 1986 Tax Reform Act eliminated the capital gains exclusion, the advantage of tax deferral remains. A common estimate is that deferral cuts the effective

tax burden in half; I will therefore assume that the effective tax rate on capital gains (denoted z in the Appendix) is 0.125.

Using these parameter values, I obtain the results displayed in Table 3. Note that, as before, the AMT reduces the effective tax rate on every asset category. For internal finance, the declines range from 0.2 percentage points to 4.1 percentage points. Thus, the tax on preference items once again turns out to be favorable toward the use of preference items. As with equity finance, there is also significant compression of the range of effective tax rates. In the absence of the AMT, the difference between the highest and lowest rate would be 19.8 percentage points; with the AMT, this difference is only 15.9 percentage points. In addition, convergence of effective rates occurs between virtually all individual pairs of asset categories. Note that assets in the five-, seven-, and ten-year categories have negative effective tax rates, which implies that they are subsidized on the margin. The presence of the AMT increases this subsidy and therefore accentuates distortions between these investment categories and expensed inputs.

2.3 *Debt Finance*

When a corporation finances an investment by issuing debt, it must promise bondholders a rate of return before personal taxes at least as great as that available on alternative investments (r). However, since interest payments are tax deductible at the corporate level (whereas dividends and capital gains are not), the required return on such an investment before corporate taxes (that is, the cost of capital) is substantially lower under debt finance than under either of the other financing options considered above. It follows that effective tax rates on debt-

TABLE 3
Effective Tax Rates with Internal Finance

Asset category	Effective tax rate without AMT (percent)	Effective tax rate with AMT (percent)
3-year, 200 percent	2.7	0.6
5-year, 200 percent	−1.5	−2.5
7-year, 200 percent	−4.0	−4.2
10-year, 200 percent	−1.7	−2.3
15-year, 150 percent	6.7	4.2
20-year, 150 percent	9.7	6.6
Residential	13.2	9.7
Nonresidential	15.8	11.7

financed investments are much lower than those on equity-financed or internally financed investments.

There are qualitative as well as quantitative differences between effective tax calculations under debt and equity finance. In particular, when the corporation uses equity or retained earnings, its rate of discount depends only upon investors' required rate of return and on parameters of the individual income tax system. In contrast, with debt finance, the corporation's rate of discount depends on the value of interest deductions, which is in turn determined by parameters of the corporate tax system. This observation has extremely important implications for the AMT. When a corporation incurs AMT liabilities, it pays taxes at a lower marginal rate (τ rather than τ^*). Thus, the AMT diminishes the value of interest deductions, both in the aggregate and on the margin. As a result, exposure to the AMT is much more likely to increase a firm's cost of debt capital than its cost of equity or internal capital. In addition, the lost value of interest deductions will depend critically on the probability that a firm will incur AMT liabilities. It follows that the break-even tax preference level described by equation (1) will, under debt finance, depend on characteristics of the corporation (specifically, ϕ).

I quantify the impact of the AMT on effective tax rates by employing the formulas developed in the Appendix. Results are presented in Table 4. Note that the effective tax rates in this table are all negative, which indicates that corporate tax system provides a subsidy to marginal debt-financed investments. This finding reflects the deductibility of interest payments and is consistent with the results of other authors.

Several patterns emerge from the above calculations. First, the AMT generally *increases* the effective tax rate on debt-financed investments.

TABLE 4
Effective Tax Rates with Debt Finance

Asset category	Effective tax rate without AMT (percent)	Effective tax rate with AMT (percent)
3-year, 200 percent	−35.3	−31.6
5-year, 200 percent	−39.1	−34.5
7-year, 200 percent	−41.5	−36.3
10-year, 200 percent	−40.2	−35.2
15-year, 150 percent	−34.7	−30.6
20-year, 150 percent	−32.9	−29.0
Residential	−31.1	−27.3
Nonresidential	−29.2	−25.7

Increases range from 3.5 to 5.2 percentage points. This stands in sharp contrast to the results of the preceding subsections. Second, there is still a general tendency toward compression of the range of effective tax rates. In the absence of the AMT, the difference between the highest and lowest tax rates for depreciable investments is about 12.3 percentage points; with the AMT, this difference falls to 10.6 percentage points. In addition, we observe convergence of effective tax rates for all but a few pairs of investment categories.

Although the AMT increases effective tax rates for depreciable investments under debt finance, it is still likely to reduce the overall level of distortion in production. Recall that for equity and retained earnings, tax rates in the absence of the AMT were for the most part positive, and that the AMT pushed these rates toward zero, thereby reducing distortions between depreciated and expensed inputs. For debt finance, tax rates in the absence of the AMT are negative; in raising these rates, the AMT once again pushes them toward zero, thereby reducing distortions between depreciated and expensed inputs.

These observations also imply that the AMT reduces the tax advantages of debt as a source of financing. Specifically, a comparison of the entries in Tables 2 and 4 reveals that the AMT significantly compresses the range of effective tax rates for debt and equity capital. For example, the effective tax rate on debt-financed, fifteen-year assets is, in the absence of an AMT, 72.2 percentage points lower than the rate for equity-financed, fifteen-year assets. However, in the presence of the AMT (and under the assumption that the firm incurs AMT liabilities with 20 percent probability), this differential closes to 64.9 percentage points—roughly a 10 percent reduction (7.3 percentage points) in the tax wedge. The AMT should therefore contribute to the efficiency of corporate capital structure.

Overall, the AMT generally compresses effective tax rates across classes of investments, other inputs, and sources of financing. It is therefore likely to reduce economic losses arising from the distortionary effects of taxes on the internal decisions of individual firms.

3. THE IMPACT OF THE AMT ON ECONOMIC ACTIVITY ACROSS FIRMS

All of the calculations in the preceding section refer to a single firm with a given probability of incurring AMT liabilities. If this probability differs across firms, then the introduction of the AMT may create differences in effective marginal tax rates where none existed previously, and this could distort the allocation of capital among firms. Noting this potential

effect, Graetz and Sunley concluded that the AMT would probably have undesirable effects on economic efficiency.

The uneven incidence of the AMT may also affect the organization of economic activity. In particular, many analysts have predicted that the AMT will significantly stimulate mergers and leasing arrangements (see, for example, the *Wall Street Journal*, 1987). Such transactions have the effect of transferring the ownership of tax preference items to companies that do not expect to pay taxes under the AMT provisions and that therefore can reap the full benefits of favorable tax treatment.

The effect of mergers on AMT liabilities is straightforward. Through merger, the "excess" taxable income of one firm can be used to offset the "deficit" of book income over taxable income for the other firm, thereby eliminating AMT exposure and reducing the total tax liability. The impact of leases is considerably more complex. A lease allows the lessee to reduce marginal AMT liabilities by reporting the same expense for book and tax purposes. However, in contrast to mergers, incremental leases do not affect the inframarginal AMT liabilities experienced by the lessee. Furthermore, the lease transfers income to the lessor, who is more likely to pay taxes at the higher marginal rate τ rather than at τ^*. Complex and ingenious lease provisions may therefore be required to reduce total tax liabilities.

Leasing and mergers are not merely paper transactions. It is well known that institutional arrangements affect the efficiency of economic activity. Leasing may arise naturally in an undistorted economy for a variety of reasons, and the extent of leasing will reflect a balance between the costs and benefits of this activity. In some cases, the lessor may have an absolute advantage in maintenance of equipment and may provide upkeep as part of the lease. Advantages are counterbalanced by disadvantages, such as the incentive problems that develop when the lessee does not bear the full cost of wear and tear on equipment. It is important to realize that these advantages concern real economic resources and that the artificial stimulation of otherwise unprofitable leasing or mergers promotes inefficiency.

The quantitative importance of the various distortions noted above depends critically on the variation in exposure to the AMT across firms. Since the new AMT provisions have been in place for a very short time, accurate measurement of this variation is problematic. Exposure to the AMT must be inferred from historical relationships between taxable income and book income.

Using data from Standard and Poor's Compustat file, I have constructed a rough index of exposure to the AMT. The motivation for this index is as follows. Firms incur AMT liabilities whenever 20 percent of

the AMT base (henceforth denoted A) exceeds 34 percent of regular taxable income (Y). Equivalently, the AMT kicks in whenever $Y/A < 0.59$. While Compustat does not contain either Y or A, certain proxies are available. As a rough approximation, the AMT base is equal to taxable income plus one-half of the difference between gross-of-tax book income (B) and taxable income. This implies that, roughly speaking, firms incur AMT liabilities whenever $Y/B < 0.42$. Although data on book income (as well as federal and foreign tax liabilities) are available, data on taxable income are not. In its place, I use actual federal tax liabilities, T. Assuming that corporate tax liabilities were 46 percent of taxable income prior to 1986, the AMT would apply whenever $T/B < 0.19$. This last step involves two additional approximations. First, tax liabilities were not uniformly equal to 46 percent of taxable income. Second, the TRA of 1986 changed the taxable income base, so that even a precise measure of taxable income prior to 1987 would not be entirely appropriate. Nevertheless, T/B provides a useful index exposure to the AMT.

For any given firm in any year, extraordinary events may produce extreme values of T/B. One extreme value does not indicate that that firm has systematically greater exposure to the AMT. In order to average out these unusual events, I calculate T/B by pooling firms in Standard Industrial Classification (SIC) two-digit industries. In addition, I compute three- and five-year averages of T/B in order to average out the effects of unusual industry-wide events that might have occurred in particular years. Large variations in multiple-year, industry-wide averages of T/B would constitute strong evidence that firms in some industries are significantly more exposed to the AMT than those in other industries. This would raise the possibility that the AMT significantly distorts the allocation of capital between firms and industries, and it would also point to the potential existence of large incentives for mergers and lease arrangements.

My calculations are based on a sample of 852 firms, representing 53 two-digit industries. Firms were excluded from this sample if any of the critical variables were unavailable during the period 1982 through 1987. Industry-level results are presented in Table 5. One immediately notices a great deal of variation in the index of exposure to AMT liabilities (T/B).

It is somewhat easier to evaluate the magnitude of this variation by consulting Table 6, which summarizes the distribution of indices. For both three- and five-year averages, the index of exposure is less than 0.15 for roughly one-third of the industries. Firms in these industries must be viewed as having very high exposure to the AMT. The reader will note that, in a small number of cases, the index was actually negative. For two industries, this occurred because firms recorded positive

TABLE 5
Indices of AMT Exposure by Industry

SIC classification	*Index of AMT exposure*	
	1984–1986	1982–1986
100	−0.471	−0.194
900	0.003	0.004
1000	0.227	0.317
1200	0.024	0.088
1300	0.081	0.065
1400	0.276	0.189
1500	0.010	0.020
1600	0.494	0.339
2000	0.249	0.244
2100	0.351	0.331
2200	0.354	0.312
2300	0.446	0.431
2400	0.202	0.155
2500	0.346	0.373
2600	0.178	0.165
2700	0.370	0.373
2800	0.150	0.141
2900	0.053	0.068
3000	0.173	0.201
3100	0.376	0.390
3200	0.305	0.218
3300	−0.306	−0.130
3400	0.269	0.254
3500	0.304	0.414
3600	0.159	0.173
3700	0.114	0.076
3800	0.227	0.216
3900	0.478	0.418
4000	−0.067	−0.018
4200	0.346	0.320
4400	0.000	0.000
4500	0.118	0.078
4700	0.055	0.010
4800	0.271	0.260
4900	−0.352	−0.182
5000	0.367	0.368
5100	0.364	0.329
5200	0.368	0.372
5300	0.268	0.264
5400	0.357	0.354
5500	0.388	0.399
5600	0.398	0.395
5700	0.326	0.285
5800	0.252	0.261

5900	0.398	0.396
6100	−0.036	0.530
6200	0.124	0.107
6300	0.084	0.073
6400	0.361	0.293
6500	0.206	0.109
6700	0.014	0.014
7000	0.230	0.264
7200	0.379	0.377

tax payments but negative book income. The index does not indicate high exposure to the AMT in these unusual cases. For both three- and five-year averages, the index exceeds 0.30 for roughly 30 percent of the industries. Firms in these industries must be viewed as having relatively little exposure to the AMT.

These calculations confirm the impression that there is substantial and persistent variation in the probability of incurring AMT liabilities both across firms and across industries. This is hardly surprising, since minimum tax provisions are intended to compensate for the excessive use of preference items by certain firms and industries. Nevertheless, this finding raises the very real possibility that the AMT significantly distorts both the allocation of capital and the organization of economic activity, as argued by Graetz and Sunley. In the remainder of this section, I argue that this appearance is misleading. Despite the existence of large and persistent differences in exposure to the AMT, the resulting distortions will most likely be negligible.

Consider first possible distortions involving the allocation of capital across firms and industries. One might be inclined to evaluate the potential significance of these distortions by making calculations such as those presented in Table 2. Previously, I interpreted these numbers as effective tax rates for a single firm with and without the AMT. One might also interpret them as effective tax rates for firms with differing probabilities of incurring AMT liabilities (specifically, 0 and 20 percent). Under this alternative interpretation, the figures suggest that the AMT creates substantial differences between effective marginal tax rates across firms. This is in essence the argument advanced by Graetz and Sunley.

Yet this argument is misleading. One must consider that the average firm does not rely exclusively on a single source of investment funds but instead strives to achieve some optimal capital structure through the balanced use of new equity, debt, and retained earnings. Such a firm evaluates potential investments by applying a *weighted average cost of capital*. While it is true that the AMT reduces effective tax rates for equity-

TABLE 6
Distribution of Indices of AMT Exposure

Range	*Index of AMT exposure*	
	1984–1986	1982–1986
Less than 0	5	4
0.00 to 0.05	5	5
0.05 to 0.10	4	6
0.10 to 0.15	4	4
0.15 to 0.20	3	3
0.20 to 0.25	6	4
0.25 to 0.30	5	7
0.30 to 0.35	5	6
0.35 to 0.40	13	10
0.40 to 0.45	1	3
0.45 to 0.50	2	0
Greater than 0.50	0	1

financed and internally financed investments, it raises effective tax rates for debt-financed investments. These effects are, for the average firm, roughly offsetting.

I illustrate this point by calculating effective tax rates based on the weighted average cost of capital for "representative" firms that differ only in their exposure to the AMT. Statistics presented by King and Fullerton indicate that approximately 60.2 percent of the average investment dollar comes from internal funds. New equity issues provide 4.8 percent of investment funds, while borrowing provides 34.9 percent. I use these weights in computing the weighted average cost of capital for each firm. In addition, the average firm also uses a variety of different assets. King and Fullerton's figures indicate that buildings comprise roughly one-half of the corporate capital stock. I assume that all such buildings are nonresidential. Lacking data on the distribution of other assets over the six other ACRS categories, I assume for illustrative purposes that the representative firm uses three-, five-, seven-, ten-, fifteen-, and twenty-year assets in equal proportions.

Effective tax rate calculations based on the weighted average cost of capital are presented in Table 7. Note that I have made separate calculations for firms that will incur AMT liabilities with probabilities of 0, 20, 40, 60, 80, and 100 percent. The most striking feature of Table 7 is that the effective tax rate is almost entirely independent of exposure to the AMT. Firms that incur AMT liabilities with 20 percent probability pay an

TABLE 7
Effective Tax Rates for Weighted Average Cost of Capital

Probability of incurring AMT liabilities	Effective tax rate (percent)
0.0	7.92
0.2	8.10
0.4	8.00
0.6	7.90
0.8	7.72
1.0	7.48

effective rate that is less than 0.2 percentage points higher than the effective rate for firms that never incur AMT liabilities. Indeed, there is practically no variation (less than 0.4 percentage points) in the effective tax rate for firms with AMT exposure running from 0 to 80 percent. While firms that face the AMT with certainty experience larger declines in effective tax rates, the differences are still very small in comparison with the differences noted in section 2.

One might well argue that not all firms employ the three sources of investment funds in these representative proportions. Among the class of firms that rely primarily on equity, the AMT will have an uneven impact, lowering effective marginal tax rates more for firms with high probabilities of incurring AMT liabilities. Likewise, the AMT will also have an uneven impact among firms that rely primarily on debt, raising effective tax rates more for firms with high probabilities of facing the alternative tax. Yet the overall effect is to reduce the variation in effective tax rates among all firms. The effective tax rates of representative firms (those with typical capital structures) are essentially unaffected by the imposition of the AMT. The effective tax rates of firms that are taxed lightly on the margin (that is, those that rely heavily on debt) tend to rise toward the average, and the effective tax rates of firms that are taxed heavily on the margin (that is, those that rely heavily on equity) tend to fall toward the average. While the size of the movement toward the average tax rate for any given firm depends upon that firm's probability of incurring AMT liabilities, this does not alter the fact that the alternative tax compresses the range of effective tax rates around the mean. Furthermore, these effects are probably substantial in light of the calculations summarized by Tables 2, 3, and 4. Thus, if anything, the AMT equalizes effective marginal tax rates and improves (in the sense of efficiency) the allocation of capital across firms.

I now turn to issues concerning the organization of economic activity. The extent to which the AMT stimulates leasing and mergers is still largely a matter of speculation. There is, however, some highly suggestive evidence concerning mergers. Incentives for mergers arise from a variety of tax provisions. One of these—the treatment of tax-loss carryforwards—has existed for some time. Yet a detailed study of corporate mergers by Auerbach and Reishus (1987) revealed that tax considerations played a very small role in actual transactions. It is highly unlikely that the AMT will alter this situation.

In contrast, the use of leases as tax-avoidance schemes is very familiar, and there are certainly individual cases in which the AMT has placed a significant role (see the *Wall Street Journal*, 1987). Yet it is not at all obvious that the aggregate impact of the alternative tax on leasing activity will be very large. Because leases have nontax advantages and disadvantages, tax considerations may in most cases be of secondary importance. In addition, AMT-oriented leases tend to be very complex. A simple lease transfers both ownership and income to the lessor. The lease contract must guarantee the lessor his or her required rate of return after tax and still leave something for the lessee. This is possible only if the effective marginal tax rate of the lessor is less than that of the lessee. Since the AMT narrows the range of effective tax rates, it reduces the scope for tax-oriented leases of this simple form. There is some indication that the leasing industry has in a few instances succeeded in designing more complex contracts that transfer the tax advantages of preference items from companies that face the AMT to companies that do not. These contracts have the disadvantage of being cumbersome and may in some cases be of dubious legality. At a minimum, companies that enter such contracts risk having them invalidated by the IRS or Congress.

Preliminary data on leasing activity under the new tax regime are now available and shed some light on the quantitative importance of the issues discussed above. One might be inclined to examine the overall level of leasing activity to see whether this activity accelerated after passage of the TRA. Unfortunately, this exercise is likely to prove uninformative. The TRA of 1986 included a number of provisions that would tend to depress leasing. These include the elimination of the investment tax credit and the reduction of depreciation allowances. If leasing activity remained near its previous levels, this might reflect offsetting tax effects. Furthermore, if it deviated from past levels in either direction, this could be attributed to general economic conditions. We simply do not have sufficient experience with the AMT or sufficient variation in other tax parameters to judge the AMT's impact on leasing from aggregate data.

The alternative is to use firm-level data. If the AMT stimulates leasing, then leasing among firms with systematically greater exposure to the AMT should have risen between 1986 and 1987 relative to leasing among firms with little exposure. Earlier in this section, I argued that the ratio of federal income tax to gross-of-tax book income provides an approximate measure of exposure to the AMT. It is possible to construct this measure—either for individual firms or industries—using data contained in the Compustat files. In addition, Compustat also contains firm-level data on leasing. Reported corporate liabilities include capitalized lease obligations, and most companies separately report the present value of noncapitalized leases (a lease is classified as capitalized if it transfers property ownership to the lessee, if it contains a bargain purchase option, if the lease term is equal to 75 percent or more of the economic life of the property, or if the present value of minimum lease payments equals or exceeds 90 percent of the fair value of the property). Together, these data permit an exploratory analysis of the relationship between the AMT and leasing.

For each of the firms in my sample, I constructed the index of exposure to the AMT based on 1986 book income and tax payments. Since 1987 tax payments were uncharacteristically high for firms that actually paid the alternative tax, it was inappropriate to use the current (1987) value of this index. I then created two variables measuring the change in lease obligations between 1986 and 1987. The first variable is the change in capitalized lease obligations between 1986 and 1987, scaled by the firm's assets in 1986. The second variable measures the change in noncapitalized lease obligations and is constructed in the same way. In addition to making the sample restrictions mentioned earlier, I dropped all firms that reported negative book income or total assets in 1986.

Using the firm-level data described above, I was unable to discern any systematic relationship between exposure to the AMT and the change in lease obligations between 1986 and 1987. The correlation between the index of AMT exposure and the change in capitalized leases was 0.003. To the extent the AMT stimulates leases, one would have expected this correlation to be negative. Furthermore, the estimated correlation coefficient was not statistically distinguishable from zero at any reasonable level of confidence. While the correlation between the index of AMT exposure and the change in noncapitalized leases was negative, its value was only −0.007, and it too was statistically indistinguishable from zero.

The lack of significant correlation does not necessarily imply that the quantitative relationship between the variables in question is small. The importance of this relationship may simply be obscured by variance arising from other sources. It is therefore useful to summarize these

relationships through simple regressions. I present results in Table 8. Here I would like to draw attention to the magnitudes of the estimated coefficients rather than to their statistical significance (in view of the correlation coefficients, it should come as no surprise that the coefficients are statistically indistinguishable from zero). The coefficient of the index of AMT exposure is, of course, positive in the equation for capitalized leases. While the corresponding coefficient is negative in the equation for noncapitalized leases, it is very small. To interpret this coefficient, consider two hypothetical firms. Suppose that their indices of AMT exposure are 0.1 and 0.4 (that is, toward the extremes of the observed range). The regression estimates indicate that, on average, noncapitalized leases would have increased by about 0.707 percent of assets for the firm with high AMT exposure and 0.702 percent of assets for the firm with low AMT exposure. It is hard to argue that the difference—0.005 percent of assets, or about 0.75 percent of the change in noncapitalized leases—is of much economic significance.

It is certainly possible that the lack of a significant relationship reflects the fact that my index of AMT exposure is a very poor proxy for true exposure. By aggregating over industries and averaging over time as before, one might obtain a better measure of the systematic and persistent exposure to AMT liabilities. I have therefore constructed measures of the change in lease obligations by industry (scaled by the assets of the industry) and calculated correlations with the five-year averages of industry-exposure indices listed in Table 5 (correlations based on three-year averages are similar). Surprisingly, these correlations are positive. For capitalized obligations, the correlation coefficient is 0.071, while for noncapitalized obligations, it is 0.295. The latter coefficient is significant at the 95 percent level of confidence. There is certainly no indication that firms in industries with systematically high exposure to the AMT increased leasing more between 1986 and 1987 than did firms in industries with systematically low exposure to the AMT.

TABLE 8
Regression Results

Dependent variable	Change in capitalized lease obligations (percent of assets)	Change in noncapitalized lease obligations (percent of assets)
Intercept	−0.0121	0.709
	(0.0320)	(0.132)
Index of AMT exposure	0.0020	−0.018
	(0.0022)	(0.091)

I have made no attempt in the preceding analysis to control for nontax factors that might explain changes in lease activity. In addition, it is possible that the impact of the AMT on leasing will develop slowly over a period of years and that the effect in the first year was uncharacteristically small. For these reasons, one must regard my calculations as preliminary and exploratory. Nevertheless, the absence of the predicted effect is striking and should help to minimize concern that the AMT will significantly distort leasing decisions.

4. CONCLUSIONS

In this paper, I have studied the impact of the corporate AMT on capital budgeting and financial decisions within firms as well as on the allocation of capital and economic activity across firms. My calculations reveal that the AMT compresses the range of effective tax rates on alternative classes of investments and sources of financing, thereby reducing the distortionary impact of taxation on decisions taken by individual firms. In addition, although the incidence of the AMT is very uneven, this does not contribute significantly to the disperson of effective marginal tax rates across firms. For firms with typical financial structures and investment profiles, effective tax rates are almost entirely independent of exposure to AMT liabilities. Furthermore, the AMT tends to move effective tax rates for atypical firms toward the mean, thereby reducing the distortionary impact of taxation on the allocation of capital across firms. Finally, there is little reason to believe that the AMT will have a significant impact on the organization of economic activity. Previous evidence suggests that merger activity will probably be unaffected. Some exploratory analysis of data from Standard and Poor's Compustat file reveals little or no relationship between systematic exposure to the AMT and recent changes in leasing activity. Therefore, despite the fact that the AMT was not motivated by efficiency considerations, it seems compatible with the goals of minimizing tax distortions and promoting economic efficiency.

APPENDIX

In this Appendix, I derive expressions for the cost of capital under a corporate income tax system that includes AMT provisions. Consider a firm that maintains a steady-state production profile with the input vector x. Define the units of input so that the price of one unit of each type of input is \$1. The input vector x results in production y according to the stochastic relationship

$$y = f(x) + \epsilon.$$

I will assume for simplicity that the ϵ is distributed identically and independently across periods over the interval $[\underline{\epsilon}, \bar{\epsilon}]$ and that its distribution is described by the density function $\theta(\epsilon)$.

Each input i depreciates at the geometric rate δ_i; the firm undertakes replacement investment in the steady state. Each period, the firm deducts depreciation allowances A from income in order to calculate conventional corporate income taxes; it deducts A^* for purposes of calculating AMT liabilities (in a steady state, these amounts remain constant through time).

The conventional tax rate is τ, while the AMT rate is τ^*. Under the conventional tax, aftertax income is given by $(1 - \tau)y + \tau A - \delta x$; for the AMT, aftertax income is $(1 - \tau^*)y + \tau^* A^* - \delta x$. The firm actually pays tax under the rules that yield the largest tax liability or, equivalently, the lowest aftertax income. Thus, the level of gross income at which the firm switches from paying taxes under the AMT to the conventional tax is given by

$$y^S \equiv \frac{\tau A - \tau^* A^*}{\tau - \tau^*}.$$

Expected aftertax profits in any single period are then given by

$$W = \int_{\underline{\epsilon}}^{y^S - f(x)} [(1 - \tau^*)(f(x) + \epsilon) + \tau^* A^* - \delta x]\, \theta(\epsilon) d\epsilon$$

$$+ \int_{y^S - f(x)}^{\bar{\epsilon}} [(1 - \tau)(f(x) + \epsilon) + \tau A - \delta x]\, \theta(\epsilon) d\epsilon,$$

and the total value of the firm is

$$V = \sum_{t=0}^{\infty} \left[\frac{1}{1 + \rho - \pi} \right]^t W,$$

where ρ is the firm's discount rate (the required nominal aftertax rate of return on capital), and π is the rate of inflation.

Now we contemplate an incremental increase in some input i at time 0 and allow this incremental input to depreciate without replacement. Suppose that a \$1 investment of this type yields depreciation allowances

of d_{it} under the conventional tax system t years after installation. For the AMT, these allowances are d^*_{it}. Then

$$\frac{dV}{dx_i} = \left[\frac{1}{\rho + \delta - \pi}\right][(1 - \phi)(1 - \tau)f_i + \phi(1 - \tau^*)f_i - \delta]$$

$$+ (1 - \phi)\tau \sum_{t=0}^{\infty} \left[\frac{1}{1 + \rho}\right]^t d_{it} + \phi\tau^* \sum_{t=0}^{\infty} \left[\frac{1}{1 + \rho}\right]^t d^*_{it},$$

where

$$\phi = \int_{\underline{\epsilon}}^{y^S - f(x)} \theta(\epsilon)d\epsilon.$$

Optimal investment implies that the preceding derivative equals the cost of a unit of input, which has been normalized to unity. Letting

$$D_i = \sum_{t=0}^{\infty} \left[\frac{1}{1 + \rho}\right]^t d_{it}$$

(and similarly for D^*_i), the first-order condition can be rewritten (after some reorganization) as

$$f_i = \left\{\frac{1 - [(1 - \phi)\tau D_i + \phi\tau^* D^*_i]}{1 - [(1 - \phi)\tau + \phi\tau^*]}\right\}(i + \delta - \pi).$$

To obtain the cost of capital (p), we simply subtract economic depreciation from this expression for the pretax return (that is, $p = f_i - \delta$). This yields

$$p = \left\{\frac{1 - [(1 - \phi)\tau D + \phi\tau^* D^*]}{1 - [(1 - \phi)\tau + \phi\tau^*]}\right\}(\rho + \delta - \pi) - \delta. \qquad \text{(A.1)}$$

The firm's discount factor, ρ, depends upon the nominal rate of return available on alternative investments (i) and the source of investment funds. There are three possible sources of funds: new equity, retained earnings, and debt. A separate calculation is required for each.

I will begin with new equity. Suppose that the expected after-

corporate-tax rate of return on an investment is ρ. Potential equity-holders have a choice between financing this project or making some alternative investment that yields the nominal market rate of return, i ($i = r + \pi$). Since both ρ and i measure returns before individual income taxes, investors will be indifferent only when these two rates are equal. Thus, the aftertax rate of return on the marginal investment is given by $\rho = i$, as in King and Fullerton. To obtain the cost of capital under equity finance, we simply make this substitution in equation (A.1).

Next, consider retained earnings. King and Fullerton argue that when the source of finance for an investment project is retained earnings, the required after-corporate-tax rate of return is given by

$$\rho = i\left[\frac{1-m}{1-z}\right],$$

where m is the effective personal tax rate on ordinary income, and z is the effective personal tax rate on capital gains. The cost of capital for internally financed investments is then obtained from substituting this expression into equation (A.1).

Finally, consider debt finance. I derive the appropriate rate of discount for debt-financed investments by modifying the argument used by King and Fullerton. Consider some investment that provides a rate of return ρ after corporate taxes. If this investment has been financed through debt, the corporation pays interest i per dollar borrowed. Interest payments are tax deductible, so that expected interest payments, net of tax deductions, are $i(1 - (1 - \phi)\tau - \phi\tau^*)$. The investment yields a positive return to shareholders whenever ρ exceeds this term. Thus, the firm is just indifferent toward the marginal investment when

$$\rho = i(1 - (1 - \phi)\tau - \phi\tau^*).$$

This expression defines the firm's rate of discount. The cost of capital for debt-financed investments is obtained by substituting for ρ in equation (A.1).

REFERENCES

Auerbach, Alan J., and Davie Reishus. 1987. The effects of taxation on the merger decision. NBER Working Paper no. 2192.

Dworin, Lowell. 1987a. The impact of the corporate alternative minimum tax: A Monte Carlo simulation study. In *Compendium of tax research, 1987*. Washington, D.C.: Department of the Treasury.

———. 1987b. Impact of the corporate alternative minimum tax. *National Tax Journal* 40: 505–13.

Graetz, Michael J., and Emil Sunley. 1986. Minimum taxes and comprehensive tax reform. Yale University Mimeo.

King, Mervyn A., and Don Fullerton. 1984. *The taxation of income from capital.* Chicago: University of Chicago Press and NBER.

Lucke, R. B., M. R. Eisenbach, and L. L. Dildine. 1986. The Senate alternative minimum tax: Does it snare only the tax abusers? *Tax Notes,* August 18: 681–90.

Wall Street Journal. 1987. Firms expect leasing to save them millions under new tax law. March 11.