

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: The Effects of Taxation on Multinational Corporations

Volume Author/Editor: Martin Feldstein, James R. Hines Jr., R. Glenn Hubbard

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-24095-9

Volume URL: <http://www.nber.org/books/feld95-2>

Conference Date: January 13-15, 1994

Publication Date: January 1995

Chapter Title: Interest Allocation Rules, Financing Patterns, and the Operations of U.S. Multinationals

Chapter Author: Kenneth A. Froot, James R. Hines, Jr.

Chapter URL: <http://www.nber.org/chapters/c7747>

Chapter pages in book: (p. 277 - 312)

10 Interest Allocation Rules, Financing Patterns, and the Operations of U.S. Multinationals

Kenneth A. Froot and James R. Hines, Jr.

10.1 Introduction

International business operations pose special tax problems for multinational firms as well as for the governments that tax them. Multinational firms often centralize certain activities that generate returns in more than one country. For example, firms may borrow money in one country in order to deploy the funds elsewhere. Firms are entitled to claim tax deductions for interest costs, but countries in which they borrow may not permit all of the associated interest expenses to be deducted against local income for tax purposes. The method used to calculate allowable interest tax deductions can, in turn, affect financing choices and operating decisions.

American tax law permits only incomplete deductibility of the interest expenses of multinational firms. U.S. law specifies rules that determine the extent to which interest costs incurred by multinational firms in the United States can be deducted for tax purposes against U.S. income. These rules are often changed, the last major change occurring in 1986.

This paper examines the impact on firm behavior of the change in the U.S. interest allocation rules introduced by the Tax Reform Act of 1986. The 1986 act significantly reduced the tax deductibility of the U.S. interest expenses of certain American multinational corporations. Congress changed the law in 1986 because it was concerned that some U.S.-based firms received tax deduc-

Kenneth A. Froot is professor of business administration at Harvard Business School and a research associate of the National Bureau of Economic Research. James R. Hines, Jr., is associate professor of public policy at the John F. Kennedy School of Government, Harvard University, and a faculty research fellow of the National Bureau of Economic Research.

The authors are grateful to Paul O'Connell for outstanding research assistance, and to Julie Collins for helpful comments on an earlier draft. Generous research support was provided by the National Bureau of Economic Research, the Division of Research at Harvard Business School, and the National Science Foundation (grant SES-9209373).

tions for interest expenses in the United States that enhanced their profits overseas. The 1986 act introduced a new formula for multinational firms to use in calculating the fraction of their interest expenses that can be deducted against taxable income in the United States.

This tax change increased the tax liabilities of certain American multinationals and made additional borrowing more expensive for these firms. One of the concerns raised during the deliberations over the 1986 act was that this additional cost of borrowing might discourage some firms from investing in new plant and equipment, since a sizable fraction of new investment is financed by borrowing. This paper examines the impact of the tax change on the operations of those multinational firms that were affected by the change in interest allocation rules. To do so, it is necessary to compare the behavior of the affected firms to the behavior of those firms that were unaffected by the interest allocation provisions of the 1986 act.

The results indicate that the change in interest allocation rules significantly influenced the operations of American multinational firms. Firms that were unable to deduct all of their interest expenses against their U.S. tax liabilities issued 4.2 percent less debt between 1986–91 (measured as a fraction of total firm assets), and invested 3.5 percent less in property, plant, and equipment, than did other firms. In addition, the affected firms showed a greater proclivity to lease rather than own capital assets and to reduce the scope of their foreign operations. All of these behavioral responses are consistent with the incentives created by the interest allocation provisions of the Tax Reform Act of 1986.

Section 10.2 describes the U.S. tax treatment of the interest expenses of multinational corporations and analyzes the incentives created by the Tax Reform Act of 1986. Section 10.3 describes the data used to analyze the impact of the 1986 tax change. Section 10.4 presents the results of regressions that estimate the impact of the 1986 tax change on various aspects of the operations of American multinational firms. Section 10.5 is the conclusion.

10.2 Tax Treatment of Interest Expense

This section describes the tax treatment of interest expenses of U.S. corporations, paying special attention to the treatment of multinational corporations. It identifies the incentives created by the Tax Reform Act of 1986, as a prelude to analyzing the impact of the act on the behavior of U.S. firms.

Interest expenses generally are deductible against the taxable income of U.S. corporations. There are, however, two important circumstances in which the deductibility of interest is of limited value to an interest-paying corporation. The first arises when a corporation has negative profits before interest deductions. Since a firm with losses pays no taxes, interest deductions do not reduce its tax liability. Corporations are, however, permitted to carry net op-

erating losses backward up to three years or forward up to fifteen years.¹ The second circumstance is one in which a firm is subject to the corporate alternative minimum tax (AMT); firms paying the AMT face idiosyncratic tax incentives.²

10.2.1 Foreign and Domestic Allocation of Interest Deductions

Special problems arise in allocating the interest deductions of multinational firms. The idea that underlies U.S. law is that, when a multinational firm incurs interest expense in the United States, a certain fraction of the expense should be allocated as a deduction against taxable domestic income and the remainder allocated against the firm's foreign income. The respective fractions are determined on the basis of the income-generating capacity created by the loans on which interest is paid. The extreme difficulty that this concept encounters is that it is not always clear to what extent a particular loan generates domestic-source and foreign-source income.

In order to understand the significance of the sourcing of interest deductions, it is necessary to review the treatment of foreign-source income. Due to some peculiarities of the changes in U.S. tax law after 1986, certain firms found that the cost of debt changed significantly between 1986 and 1987. The goal of the empirical work described in section 10.3 is to follow and compare the behavior of firms facing higher costs of debt to that of firms facing unchanged cost of debt.

10.2.2 U.S. Taxation of Foreign Income³

The United States taxes income on a "residence" basis, meaning that American corporations and individuals owe taxes to the U.S. government on all of their worldwide income, whether earned in the United States or not. The top U.S. corporate tax rate is now 35 percent. Since foreign profits are usually taxed in host countries, U.S. law provides a foreign tax credit for income taxes (and related taxes) paid to foreign governments, so as not to subject American multinationals to double taxation. With the foreign tax credit, a U.S. corporation that earns \$100 in a foreign country with a 12 percent tax rate (and a foreign tax obligation of \$12) pays only \$23 to the U.S. government, since its U.S. corporate tax liability of \$35 (35 percent of \$100) is reduced to \$23 by the foreign tax credit of \$12. The foreign tax credit is, however, limited to U.S. tax liability on foreign income; if, in the example, the foreign tax rate were 50

1. Tax loss carryforwards do not accrue interest, a feature that limits their value even to firms that expect to have taxable profits in the future. Scholes and Wolfson (1992) analyze the value of tax loss carryforwards in uncertain environments.

2. For the remainder of the paper, we analyze taxpaying firms that are not subject to the AMT. Lyon and Silverstein (chap. 6 in this volume) report that 30.7 percent of firms with assets over \$500 million paid the AMT in 1990.

3. Parts of this brief description of the tax system are excerpted from Hines (1991).

percent, then the firm pays \$50 to the foreign government but its U.S. foreign tax credit is limited to \$35. Hence, a U.S. firm receives full tax credits for its foreign taxes paid only when it is in a "deficit credit" position, that is, when its average foreign tax rate is lower than its tax rate on domestic operations. A firm has "excess credits" if its available foreign tax credits exceed U.S. tax liability on its foreign income.⁴ Firms average together their taxable incomes and taxes paid in all of their foreign operations in calculating foreign tax credits and the foreign tax credit limit.

Deferral of U.S. taxation of certain foreign earnings is another important feature of the U.S. international tax system. A U.S. parent firm is taxed on its subsidiaries' foreign income only when returned ("repatriated") to the parent corporation. This type of deferral is available only to foreign operations that are separately incorporated in foreign countries ("subsidiaries" of the parent) and not to consolidated ("branch") operations. The U.S. government taxes branch profits as they are earned, just as it does profits earned within the United States.

The deferral of U.S. taxation may create incentives for firms with lightly taxed foreign earnings to delay repatriating dividends from their foreign subsidiaries.⁵ This incentive arises in those cases in which firms expect never to repatriate their foreign earnings, or in which they anticipate that future years will be more attractive for repatriation (either because domestic tax rates will be lower or because future sources of foreign income will generate excess foreign tax credits that can be used to offset U.S. tax liability on the dividends).⁶ It appears that, in practice, U.S. multinationals choose their dividend repatriations selectively, generally paying dividends first out of more heavily taxed foreign earnings.⁷ Consequently, the average tax rate that firms face on foreign income need not exactly equal the average foreign tax rate faced by their branches and subsidiaries abroad.

Branch earnings and dividends from subsidiaries represent only two forms of foreign income for U.S. income tax purposes. Interest received from foreign sources also represents foreign income, though foreign interest receipts from

4. Furthermore, income is broken into different functional "baskets" in the calculation of applicable credits and limits. In order to qualify for the foreign tax credit, firms must own at least 10 percent of a foreign affiliate, and only those taxes that qualify as income taxes are creditable.

5. The incentive to defer repatriation of lightly taxed subsidiary earnings is attenuated by the Subpart F provisions, introduced in U.S. law in 1962, which treat a subsidiary's passive income, and income invested in U.S. property, as if it were distributed to its American owners, thereby subjecting it to immediate U.S. taxation. The Subpart F rules apply to controlled foreign corporations, which are foreign corporations owned at least 50 percent by U.S. persons holding stakes of at least 10 percent each. Controlled foreign corporations that reinvest their foreign earnings in active businesses can continue to defer any U.S. tax liability on those earnings. See Hines and Rice (1994) and Scholes and Wolfson (1992) for the behavioral implications of these rules.

6. It is interesting to note that the size of the tax obligation triggered by repatriation does not itself create an incentive to delay paying dividends from foreign subsidiaries since the U.S. tax must be paid eventually. See Hartman (1985).

7. See the evidence presented in Hines and Hubbard (1990).

high-tax countries are assigned their own “basket” and therefore are not averaged with other income in calculating the foreign tax credit. Royalty income received from foreigners, including foreign affiliates of U.S. firms, is also foreign-source income. Foreign governments often impose moderate taxes on dividend, interest, and royalty payments from foreign affiliates to their American parent companies; these withholding taxes are fully creditable against an American taxpayer’s U.S. tax liability on foreign income.

10.2.3 Interaction of Interest Expense and Foreign Income Rules

American firms with foreign income are generally not permitted to deduct all of their interest costs in the United States against their domestic taxable incomes. Instead, the law provides for various methods of allocating interest expenses between domestic and foreign income. The intention of the law is to retain the full deductibility of interest expense against taxable U.S. income, but only for that part of interest expense that generates income subject to U.S. taxation.

From the standpoint of taxpaying firms, the U.S. tax law’s distinction between domestic and foreign interest deductions is potentially quite important. If interest expense is deemed to be domestic, then it is deductible against the taxpayer’s U.S. taxable income. Alternatively, if it is deemed to be foreign, then the interest expense reduces foreign taxable income *for the purposes of U.S. income taxation only*. Foreign governments do not use U.S. methods of calculating interest deductions and generally do not permit U.S. firms to reduce their taxable incomes in foreign countries on the basis of interest expenses incurred in the United States. Consequently, interest expenses allocated against foreign income are valuable to a U.S. firm only if it has deficit foreign tax credits. If it has deficit credits, then some of the firm’s foreign income is subject to U.S. tax, and any additional dollar of interest expense allocated against foreign income reduces the firm’s U.S. taxable income by a dollar.⁸ With deficit foreign tax credits, firms are indifferent between allocating interest expenses against foreign income and allocating them against domestic income.⁹ If, on the other hand, firms have excess foreign tax credits, then any interest expenses allocated against foreign income are useless from the standpoint of reducing tax liabilities because foreign income generates no U.S. tax liability anyway.

The Tax Reform Act of 1986 significantly changed U.S. tax law governing the allocation of interest expenses. Prior to 1986, the interest expenses of U.S. taxpayers were determined separately for each company within a controlled

8. Curiously, the law is written so that the additional dollar of interest expense reduces taxable income without reducing the foreign tax credits available for foreign income taxes paid.

9. This statement, along with much of the analysis described in the paper, abstracts from the ability of firms to carry excess foreign tax credits backward two years and forward five years. Firms that carry excess credits forward or back may (depending on specific circumstances) face incentives that are intermediate between those of deficit credit and excess credit firms.

group.¹⁰ In principle, each company was required to allocate interest deductions between domestic and foreign source in proportion to domestic and foreign assets.¹¹ In practice, however, this rule permitted taxpayers to structure their finances in order to obtain a full tax deduction in the United States for interest expenses associated with borrowing done in the United States.

Consider, for example, the situation of an American corporation that borrows \$100 in the United States, paying interest of \$10 annually. The corporation has \$150 of U.S. assets and \$50 of foreign assets and earns profits of \$15, gross of interest costs, in the United States and profits of \$5 abroad. The corporation does no foreign borrowing. Under pre-1986 law, this corporation would be entitled to deduct only \$7.50 (75 percent of \$10) of its interest charges against U.S. income because only 75 percent of its assets produce U.S.-source income; the remaining \$2.50 of interest deductions would be allocated against foreign-source income. The same firm, with the same real business activities, could, however, reorganize its affairs in a manner that would permit all of the \$10 interest cost to be deductible against U.S. income. To do so, the parent firm need only borrow the \$100 in the U.S. market and then contribute the money as paid-in capital to a wholly owned domestic subsidiary that owns the firm's domestic and foreign operations. The domestic subsidiary pays all of its profits to its parent as dividends. The parent firm and the domestic subsidiary file a consolidated tax return and annual report. The domestic subsidiary has \$15 of U.S.-source income and \$5 of foreign-source income; it has no interest expenses. The parent firm has \$20 of income on the basis of dividends received from its subsidiary and \$10 of interest deductions. The parent firm is entitled to deduct all of its interest expense against U.S. income since the firm's assets (its wholly owned subsidiary) are all in the United States.¹²

10. Separate allocation of interest deductions for each company within a controlled group was firmly established by Treasury Regulation §1.861-8, issued in 1977. Prior to 1977, U.S. law was somewhat vague about whether all of the companies within a controlled group should be consolidated for purposes of interest allocation, though in an important case based on pre-1977 U.S. law (*ITT v. United States*) the courts held that interest should be allocated on a consolidated basis.

11. Taxpayers were given the alternative of allocating interest deductions on the basis of gross domestic income and gross foreign income, though it is hard to understand why a tax-minimizing corporation would do so, since tax-planning opportunities are so attractive using the asset method on a single-company basis. The regulation provides that, if the income method is chosen, interest deductions allocated against foreign-source income cannot be less than 50 percent of the amount that would have been allocated against foreign-source income by the asset method. Taxpayers allocating their interest deductions on the basis of domestic and foreign assets were required to do so based on the book values of those assets, unless the taxpayer elected to allocate on the basis of fair market values and could demonstrate fair market values to the satisfaction of the IRS. Once it was chosen, taxpayers were required to continue to use the fair market value method until granted permission by the IRS to discontinue its use. Book values of stock (such as a parent corporation's stock in its foreign subsidiaries) were not adjusted to include undistributed earnings and profits reinvested by the subsidiary corporations.

12. Prior to 1986, U.S. law did not use sophisticated "look-through" rules to determine the extent to which a U.S. corporation represents a U.S. asset. Instead, a U.S.-located subsidiary was considered to be a U.S. asset as long as 20 percent or more of its gross income for the prior three

The Tax Reform Act of 1986 significantly changed the method by which interest deductions are allocated, specifically by introducing a “one-taxpayer rule” in which the attributes of all members of a controlled group—whether owned directly by a parent firm or owned by the parent through one or more subsidiaries—determine the allocation of interest deductions between domestic and foreign income.¹³ The motivation for the tax change was the insight that financial fungibility implies that borrowing by one part of a controlled group directly or indirectly influences the economic activities of all of the group. The 1986 act provides that the interest expenses of a U.S. taxpayer should be allocated between domestic-source and foreign-source income based on the relative assets of the domestic and foreign operations of the controlled group. Of course, several complications attend the implementation of such a rule.

Controlled groups represent chains of 80 percent or greater ownership. Consequently, an American parent corporation that owns 75 percent of the voting stock of a domestic subsidiary, the other 25 percent of which is owned by unrelated parties, separately allocates the interest deductions of the parent corporation and the domestic subsidiary. The 80 percent rule corresponds to the requirements for filing consolidated tax returns and annual reports. The interest expenses of foreign corporations are never included within the controlled group for purposes of interest expense allocation.¹⁴

Taxpayers are required to allocate interest deductions between domestic and foreign source on the basis of the book values of assets held domestically and abroad.¹⁵ In the cases of subsidiaries that are 10 percent or more owned by members of the affiliated group, the book values of stock held in the subsidiaries are adjusted to reflect accumulated earnings and profits of the subsidiaries. Hence, in the case of an American firm that initially finances its wholly owned French subsidiary with \$100 of equity, and in which the subsidiary subsequently earns and reinvests an additional \$400, the parent’s book value of the subsidiary is adjusted to \$500 for purposes of interest expense allocation.

The 1986 act provides for a curious treatment of foreign assets and foreign interest deductions by members of a controlled group. For this purpose, the

years had U.S. source. In the example, 75 percent of the domestic subsidiary’s gross income has U.S. source.

13. The changes in the interest allocation rules introduced by the Tax Reform Act of 1986 were phased in over three years. Various phase-in rules apply to the interest on debt issued between 1983 and 1985.

14. There is an exception for financial institutions whose business is primarily with unrelated parties and that are required by law to be operated separately from nonfinancial institutions. Such financial institutions are not included with the rest of an affiliated group for purposes of interest allocation; instead, the financial institutions are treated as a separate entity for purposes of interest allocation. Special rules also apply to corporations claiming the U.S. possessions tax credit (available under §936): these corporations are included in the consolidated group for purposes of interest expense allocation if they otherwise meet all of the requirements for inclusion.

15. Taxpayers have the alternative of using the fair market values of assets held domestically and abroad, but if taxpayers do so, they are not again able to use book values without permission of the IRS.

gross value of U.S. assets and the net value of foreign assets are used. This leads to something of an asymmetric treatment of foreign and domestic borrowing for purposes of interest expense allocation. Consider, for example, the case of a U.S. firm that has \$200 of U.S. assets, of which \$150 is equity and \$50 is debt borrowed from an unrelated party; the firm also has \$200 of foreign assets, of which \$150 is parent equity and \$50 is debt borrowed by the subsidiary from an unrelated foreign party. The firm has U.S.-source gross income of \$40, U.S.-source interest cost of \$5, foreign-source gross income of \$40, and foreign-source interest expense of \$5. This firm is required to allocate almost half of its \$5 domestic interest deduction against foreign-source income,¹⁶ and the firm is not permitted to allocate any of its foreign interest expense against domestic-source income, even though the leverage situation of the foreign subsidiary is the same as the leverage situation of its American parent.

One of the consequences of the asymmetric treatment of U.S. parent firms and their foreign subsidiaries is that the tax law can encourage firms to finance their subsidiaries with debt from the American parent instead of parent equity or unrelated-party debt. Parent equity in foreign subsidiaries reduces the amount of domestic interest payments allocated against U.S.-source income. If, in the previous example, the subsidiary borrowed \$50 from its parent company instead of from an unrelated party, and the parent financed the loan to its subsidiary by borrowing an additional \$50 from unrelated U.S. parties, then the subsidiary's tax position would not change (it still gets a \$5 deduction against taxable income in the foreign country for interest paid to its U.S. parent),¹⁷ but the parent firm receives a larger interest deduction against U.S.-source income.

The U.S. Treasury issued regulations designed to prevent U.S. firms from reacting to the passage of the 1986 act by financing their foreign subsidiaries with loans from U.S. parents financed by U.S. borrowing. The first set of regulations was proposed in 1987 but never took effect.¹⁸ A second set of regula-

16. The firm has domestic assets of \$200 and foreign book assets of \$150, so it allocates four-sevenths ($\$200/\350) of its domestic interest expense against domestic-source income, and the remaining three-sevenths against foreign-source income.

17. This is subject to two qualifications. Certain countries (including the United States) impose "thin-capitalization" laws that limit the amount of related-party interest foreign firms can deduct from local taxable income. In addition, countries often impose withholding taxes on cross-border interest payments; U.S. firms with deficit foreign tax credits receive foreign tax credits for paying these taxes. Withholding taxes on interest are usually reduced, often to zero, by bilateral tax treaties.

18. The 1987 proposal was ultimately dropped because of its draconian impact on certain taxpayers with extensive foreign operations. The 1987 proposal would have first allocated domestic interest expense against foreign income to the extent of any related-party interest receipts from controlled foreign corporations of the American parent company. Remaining domestic interest expense would then be allocated between U.S. and foreign source on the basis of assets. Hence, a firm with \$100 of interest expense from borrowing by the U.S. parent in the United States, and \$20 of interest receipts from its foreign subsidiary, would first allocate \$20 of its U.S. interest expense against foreign income and then allocate the remaining \$80 of interest expense between foreign and domestic sources based on relative assets.

tions was proposed in 1988 and was temporarily in effect from that time until 1991. Under the 1988 regulations, related-party debt influences interest allocation only if the U.S. parent company's ratio of third-party borrowing to total assets differs significantly from its foreign subsidiaries' (aggregate) ratio of third-party borrowing to total assets. The idea is to flag situations in which foreign subsidiaries route their third-party borrowing through their American parent companies. The 1988 regulation requires domestic interest expense to be allocated to foreign source if foreign subsidiaries' aggregate ratio of third-party indebtedness to total assets is less than 80 percent of the third-party indebtedness of the U.S. parent company.¹⁹ In such cases, domestic interest expenses are allocated against foreign-source income until the third-party indebtedness of foreign subsidiaries *plus* domestic interest expenses, allocated in this way, equal remaining domestic-source third-party interest expenses. Remaining domestic interest expenses are then allocated between U.S. and foreign source according to the §861-8 statute.

The interest allocation rule just described is likely to have some curious effects on the actions of those firms that are bound by the 80 percent requirement. The 1988 regulations were, however, supplanted by new regulations in 1991, and taxpayers have the option of recalculating their prior tax liabilities using the new regulations in place of the 1988 regulations for every year that the 1988 regulations applied. At the time that the 1987 and 1988 regulations were proposed, many observers anticipated that they would be replaced by somewhat more flexible rules that would be made retroactively applicable. Consequently, it is unlikely that the 1988 regulations had an important effect on firm behavior.

The 1991 regulations compare current-year behavior of U.S. parent companies to their behavior over five-year "base periods." Specifically, the regulations provide that domestic interest expense deductions are allocated against foreign-source income if *both* (1) third-party indebtedness of the U.S. parent and (2) lending by the U.S. parent to its foreign subsidiaries exceed base levels (adjusted for acquisitions, dispositions, and changes in amounts of assets). Various exceptions apply to firms for whom the adjustment would be a small matter, and to firms that experience large year-to-year changes in their borrowing behavior. Once this intrafirm interest expense allocation is complete, remaining domestic interest expenses are allocated to foreign source based on the §861-8 statute. Given the complexity of the 1991 regulation, and the important role it gives to a firm's past behavior, it appears that the incentives it creates can be very firm specific. In what follows, firms are assumed not to be bound by the base-period ratio tests.

There are exceptions to the allocation rules introduced in the 1986 act. One exception concerns interest on certain nonrecourse debt. Taxpayers are permit-

19. The temporary regulation phased in the 80 percent requirement: the criterion was 50 percent for 1988, 65 percent for 1989, and 80 percent for 1990 and subsequent years.

ted to allocate all of their interest expenses against income derived from property acquired using nonrecourse debt, subject to various restrictions. Consequently, an American multinational that finances a \$100 domestic investment with \$60 of equity and \$40 of nonrecourse debt is entitled to deduct the interest expenses generated by the \$40 debt from the income flow of the \$100 investment in calculating its taxable income.²⁰ There is a second exception in which nonfinancial firms are permitted to deduct interest expenses on debt used to purchase interest-bearing securities against the interest income from those securities, again subject to certain restrictions.

10.2.4 Incentives Created by the Tax Rules

The upshot of the rules just described is that firms with excess foreign tax credits and substantial foreign assets (as a fraction of total assets) could no longer enjoy the benefits of full deductibility of interest expenses incurred in the United States after 1986. Firms with deficit foreign tax credits, or those with no foreign assets, retain full benefits of interest expense deductibility. As a consequence, firms in the first category can be expected to reduce their borrowing relative to firms in the second and can also be expected to reduce the volume of their debt-financed investment activity.²¹

In order to analyze more carefully the incentives created by changes in the U.S. tax treatment of interest deductions, it is helpful to examine firm behavior within a very stylized model. We assume that an American firm's domestic profits after depreciation and other expenses (but before interest charges) is $Q(A)$, in which A represents domestic assets. Foreign profits after depreciation and other expenses *including* interest charges on foreign borrowing are $Q^*(A^*)$, in which A^* represents foreign assets net of foreign borrowing. Domestic assets have two components: equity (E) and debt (D), so $A = E + D$. The interest rate on domestic borrowing is r ; the domestic corporate tax rate is τ , and the foreign tax rate is τ^* . Firms are assumed to repatriate their foreign after-tax profits as earned, and the foreign withholding tax rate on dividend repatriations is assumed to be zero.

We use α as an indicator variable that takes the value one if the firm has excess foreign tax credits (in this model, $\alpha = 1$ if $\tau^* > \tau$), and zero if the firm

20. The use of nonrecourse debt in a situation like this one offers a tax advantage, but is costly in that lenders typically require higher interest rates to compensate for the additional risks they bear due to the nonrecourse nature of the debt.

21. Three other studies examine the impact of interest allocation rules on the behavior of affected firms. Collins and Shackelford (1992) find that firms with large ratios of foreign to domestic assets are more likely than other firms to issue preferred stock (as a substitute for debt) in the period after 1986. Collins and Shackelford do not, however, distinguish excess foreign tax credit firms from deficit foreign tax credit firms. Altshuler and Mintz (1994) analyze the borrowing patterns of a sample of eight multinational firms, finding that firms that are unable to claim full tax deductions for interest payments in the United States are more likely to borrow abroad than to borrow in the United States. Froot and Hines (1994) examine the effect of interest allocation rules on the financing patterns of firms as they grow, finding that the tax change discouraged some firms from adding new assets to their balance sheets.

has deficit foreign tax credits. A firm is required to allocate domestic interest deductions of $rD[A^*/(A + A^*)]$ against foreign-source income. Firms with deficit foreign tax credits are unaffected by this requirement, while the after-tax profits of firms with excess foreign tax credits are reduced by the product of this amount and the statutory U.S. tax rate. The foreign operations of firms with deficit foreign tax credits are effectively taxed at the U.S. tax rate, while the foreign operations of firms with excess foreign tax credits are effectively taxed at foreign tax rates.

Firms are assumed to maximize total after-tax profits, which equal

$$(1) \quad \text{Profits} = [Q(E + D) - rD](1 - \tau) - \alpha\tau rD[A^*/(E + D + A^*)] + Q^*(A^*)[1 - \alpha\tau^* - (1 - \alpha)\tau] - \lambda A^*,$$

in which λ is the shadow cost of resources devoted to foreign operations. Consider first the behavior of firms with excess foreign tax credits. Setting $\alpha = 1$, and solving for an interior maximum of equation (1) over the choice of D , yields

$$(2) \quad Q'(A) = r + r\tau A^*(E + A^*)/[(1 - \tau)(E + D + A^*)^2].$$

Solving for an interior maximum of equation (1) over the choice of A^* yields

$$(3) \quad Q^*(A^*) = \lambda + r\tau D(E + D)/[(1 - \tau)(E + D + A^*)^2].$$

By contrast, the first-order conditions that characterize the behavior of firms with deficit foreign tax credits ($\alpha = 0$) are

$$(4) \quad Q'(A) = r,$$

$$(5) \quad Q^*(A^*) = \lambda.$$

Examination of equations (2)–(5) indicates that the interest allocation rules raise the required marginal product of debt-financed domestic and foreign capital for firms with excess foreign tax credits. The degree to which required marginal products are raised depends, in part, on terms that include ratios of domestic indebtedness and domestic assets to the square of total assets. The squared terms appear due to the conflicting effects of interest allocation on the demand for domestic and foreign assets. Interest allocation raises the after-tax cost of marginal debt used to finance the domestic operations of firms with excess foreign tax credits. At the same time, interest allocation encourages firms with excess foreign tax credits to expand their domestic operations in order to allocate as much as possible of their inframarginal domestic interest expense against U.S.-source income. The combination of these two effects attenuates, but does not eliminate, the direct effect of interest allocation on the demand for domestic assets. Interest allocation raises the required marginal product of foreign capital through its effect on the allocation of inframarginal interest expenses for firms with excess foreign tax credits.

One complication that arises in using equations (2)–(5) to estimate the effect

of interest allocation rules on firm behavior after 1986 is that foreign and domestic asset levels are themselves endogenous to the tax changes under consideration. We treat this problem by using 1986 levels of $A^*/(A + A^*)$ in the regressions as proxies for contemporaneous foreign asset fractions. Since foreign asset fractions did not influence the allocation of interest deductions in 1986, the 1986 level of this variable is arguably exogenous to the change in behavior induced by the tax change. Of course, more sophisticated treatments are possible, such as instrumenting for contemporaneous foreign asset fractions with the 1986 fraction, or parameterizing the model to include endogenously the tax-induced changes in the fraction of foreign and domestic assets. One of the difficulties that such investigations encounter is that available data are sketchy and, in particular, that asset and foreign tax credit information does not correspond exactly to definitions that apply for tax purposes. In addition, richer models that incorporate possible substitutability or complementarity of domestic and foreign assets are likely to suggest subtle variants of the procedure described above. Given the limitations inherent in using publicly available data, we proceed to analyze simple specifications of the relationships implied by equations (2)–(5).

10.3 Data and Preliminary Results

We use information reported by Compustat on the balance-sheet items of large publicly traded corporations. Compustat currently provides information on somewhat more than 7,500 companies. We select only multinational firms incorporated in the United States: firms are included if their reported foreign assets equal 1 percent or more of reported total assets for *each* year during 1986–90. This criterion is satisfied by 422 firms.

Foreign tax rate information is central to our analysis, because the hypothesis that firms maximize after-tax profits implies that deficit foreign tax credit firms will react quite differently to the Tax Reform Act of 1986 than will excess foreign tax credit firms. We construct foreign tax rates as the ratio of foreign income taxes paid to foreign pretax income as reported by Compustat. This variable is somewhat noisy, but is likely to capture the major differences between the foreign tax rates facing different firms.²² In order to attenuate some of the difficulties that accompany annual measurements of the foreign tax rate variable, firms were classified into excess foreign tax credit status based on five years of data, 1986–90. Firms for which the average foreign tax rate over that period exceeds the contemporaneous average U.S. statutory corporate tax rate are classified as excess foreign tax credit firms; all other firms are classified

22. The introduction of the new interest allocation rules in 1986, along with other tax changes, gave some firms incentives to adjust the location and tax-avoiding behavior of their foreign affiliates. In the analysis that follows we take foreign tax rates to be exogenous to U.S. tax changes. Endogenizing foreign tax rates could change the interpretation of the magnitude of the estimated coefficients.

as deficit foreign tax credit firms.²³ From our initial sample of 422 firms, 6 additional firms were excluded, 5 due to insufficient tax rate information and 1 due to major ownership changes over the 1986–91 time period.²⁴ Thus the total sample is 416 firms. Hand checking of the Compustat data led to the correction of two errors.²⁵

Mergers and other dramatic business events can complicate the interpretation of changes in the behavior of firms over the sample period. In the process of merging, firms can exhibit large changes in amounts of debt outstanding, ownership of property, plant, and equipment, and other variables that serve as indicators of reactions to changes in the interest allocation rules. One consequence is that an analyst might attribute some of these operational changes to tax incentives introduced by the 1986 act, when, in reality, the changes result from merger decisions that were uninfluenced by the 1986 act. Alternatively, the 1986 act might be responsible for important changes in capital structure or business operations, but these changes could be swamped by the effects of mergers.

These difficulties notwithstanding, it is important to bear in mind that merging firms face the same tax incentives as do firms that do not merge. One interpretation of the potential problem introduced by mergers is that firm-specific attributes captured by the constant term used in panel estimation may not remain constant for firms that merge. At the same time, merging firms may provide the clearest indication of the behavioral responses to the tax change, because firms undergoing mergers often simultaneously reexamine their capital structures, their needs for domestic and foreign assets, and other considerations that nonmerging firms may address only sporadically.

We address the problem of mergers by repeating our estimation on three data sets. The first is the universe of 416 firms described above. A second data set of 388 firms excludes any firms that record a 100 percent or greater change in assets in one year. The idea is that firms with greater than 100 percent changes in assets very likely experience substantial mergers that change the character of their business decisions. The third data set, consisting of 331 firms, uses a more restrictive threshold of 50 percent changes of assets. Because of space limitations, we do not report below all of the results using the

23. This classification of the foreign tax credit status of the firms in the sample is necessarily somewhat imprecise. The same firm may have excess foreign tax credits in one year and deficit foreign tax credits in another; furthermore, excess foreign tax credits may be carried forward five years or back two years. A firm's foreign tax credit status can be endogenous to discretionary decisions such as dividend repatriation choices. The regressions reported in the tables were all rerun replacing the zero-one foreign tax credit status variable with a continuous tax rate variable constructed as the average difference between foreign and U.S. tax rates. The results are similar to those reported in the tables.

24. Coltec Industries was taken private in 1988 and completed an IPO in early 1992.

25. Compustat reports that Alpnec's foreign-to-total asset ratio was 1.25 in 1988, while the firm's annual report implies that the ratio is 0.789; we use the latter figure. Compustat reports a jump in IBM's foreign-to-total asset ratio from 0.48 in 1990 to 0.98 in 1991. IBM's annual report indicates that the 1991 ratio was 0.469, which is the figure we use.

three data sets; instead, we report results for the largest available data set, while noting any important differences in the results that appear using the more restricted samples.

We use firm-level information available through Compustat to calculate changes over the 1984–91 time period in debt, capital in place, foreign assets, costs of goods sold, foreign sales net of intrafirm exports, taxes paid, and pre-tax income. Changes in debt are measured as the difference between the book values of total debt (long-term and current) in 1991 and total debt in 1986. Changes in capital are measured as the difference between net property, plant, and equipment (PPE) in 1991 and net PPE in 1986. Foreign assets are measured as total foreign assets in 1986, and the ratio of this variable to total assets in 1986 is used not only to control for firm characteristics (degree of multinationality) but as a component of the cost of debt finance after 1986. In some of the regressions, we use tax loss carryforwards (TLCF). Tax loss carryforwards are measured (for those firms reporting it) using 1986 data only.²⁶ We use 1986 levels of TLCF due to the potential endogeneity of TLCF over the 1986–91 period (since tax losses can be generated by rapid debt accumulation). Table 10.1 presents means and standard deviations of variables used in the regressions.

The empirical strategy is to use the identifying assumption that foreign tax credit status influences operational changes between 1986 and 1991 only through its effect, via interest allocation rules, on the cost of borrowing. Of course, differences in foreign tax credit status could reflect firm heterogeneity that is (for some reason) related in a nontax manner to operational changes over 1986–91. We attempt to control for firm heterogeneity in two ways. First, we use ratios of foreign assets to total assets, TLCF, and industry dummies to allow for industry- and firm-specific effects that may be correlated with foreign tax credit status. Second, we use firm behavior over the 1984–86 period as a control for behavior over 1986–91. If the results are driven by the 1986 tax change, foreign tax credit status should have no ability to explain changes in debt, assets, foreign operations, and other variables over the 1984–86 period. Alternatively, if the results are driven by omitted firm-specific factors that are constant over 1984–91 and correlated with the 1986 tax variables, then results for the prereform (1984–86) and postreform (1986–91) periods should look similar.

10.4 Regression Results

This section describes the results of regressions that estimate the effects of the changes in interest allocation rules on firm financing and operational patterns. The null hypothesis is that the changes in interest allocation rules had

26. Information on TLCF in 1986 is missing for 29 of the 416 firms in the sample; these 29 firms were dropped from the sample in specifications using TLCF as an explanatory variable.

Table 10.1 Variable Means and Standard Deviation

Variable	Mean	Standard Deviation	N
Δ Debt 1986–91/Assets 1986	0.2089	0.4566	416
Δ Debt 1984–86/Assets 1986	0.1341	0.5254	386
Δ PPE 1986–91/Assets 1986	0.2003	0.3903	414
Δ PPE 1984–86/Assets 1986	0.0874	0.2024	385
New leases 1986–91/Assets 1986	0.4315	0.8298	286
Δ Foreign sales 1986–91/ Assets 1986	0.3114	0.7089	409
Δ Cost 1986–91/Assets 1986	0.5051	0.9709	416
Δ Cost 1984–86/Assets 1986	0.1750	0.8093	385
FTC dummy	0.4808	0.5002	416
$[A^*/(A + A^*)]^2$	0.0836	0.1104	416
FTC dummy $\cdot [A^*/(A + A^*)]^2$	0.0400	0.0930	416
TLCF/Assets	0.0487	0.2432	387
Debt/Assets	0.2373	0.1887	416
FTC dummy \cdot (Debt/Assets)	0.1132	0.1705	416

Note: Debt is the book value of total (domestic plus foreign) debt. Assets 1986 is the book value of total assets at year-end 1986. PPE is the book value of property, plant, and equipment. New leases is the difference between actual lease expenditures and long-term commitments at the start of the period. Foreign sales is foreign-produced foreign sales, i.e., the difference between total foreign sales and exports from the United States. Cost is the total (domestic plus foreign) cost of goods sold. The FTC dummy variable takes the value one if a firm has excess foreign tax credits, and zero otherwise. The term $A^*/(A + A^*)$ is the ratio of a firm's foreign assets to its total assets in 1986. The variable TLCF/Assets is the ratio of tax loss carryforwards to total assets at year-end 1986. Debt/Assets is the ratio of the book value of debt to the book value of total assets at year-end 1986.

no impact on firm behavior; this hypothesis implies that firms simply bear the tax cost of the 1986 act. We contrast this null hypothesis with two alternative hypotheses: (I) that firms respond to the tax changes by using nondebt financing and (II) that firms respond to the tax changes by reducing their foreign operations.²⁷

27. The null and alternative hypotheses correspond to different theoretical specifications of the ease with which firms can adjust their financial and operating patterns. Stiglitz (1973) argues that the tax advantage to debt makes borrowing a firm's preferred method of financing marginal investments. If this argument is correct, and firms continue to prefer debt to other financing methods even after some of its tax advantages are lost due to the interest allocation rules, then firms will not react to the tax changes by substituting other financing methods for debt, but will react by reducing the size of foreign and total operations. Alternatively, the Miller (1977) model of financial equilibrium implies that firms affected by the interest allocation rules will change their capital structure to pure equity finance. As long as the capitalization of the affected firms does not exceed the initial amount of equity on the market, this type of financial arbitrage implies that the interest allocation rules will not affect the capital costs, or real operations, of any firms. Gordon and Malkiel (1981) examine a model in which debt is tax preferred but its use raises the probability that a firm will incur costs associated with bankruptcy; this model carries implications between those of the Stiglitz and Miller models.

We examine these alternatives by constructing independent variables that distinguish firms by their exposures to the tax change as of 1986. Firms with excess foreign tax credits and high ratios of foreign to domestic assets are the ones least able to take deductions against their U.S. tax liabilities for domestic interest payments. The foreign tax credit status dummy variable (described above) is a simple measure of firm exposure to the change in the interest allocation rules. It is possible to obtain more precision by measuring interaction effects. For example, we use the squared ratio of foreign assets to total assets, interacted with the foreign tax credit dummy variable, to detect differences in firm behavior based on foreign tax credit status, *given* the ratio of assets abroad. According to the model, excess foreign tax credit firms ought to show greater behavioral responses the higher are their ratios of foreign to total assets. We also control for other firm characteristics that might be correlated with firm responses, such as growth over the sample period, industry, and presence and amount of tax loss carryforwards.

We choose dependent variables to identify changes in (1) firm capital structure, (2) investment spending, (3) lease commitments, and (4) foreign operating levels. These variables are chosen because of their relationships with the alternative hypotheses. For example, alternative hypothesis I implies that firms can costlessly substitute away from higher-priced debt toward other financial vehicles; this behavioral response should appear as a change in capital structure. In addition, investment spending would tend to fall and leasing to increase in excess foreign tax credit firms, as they take assets off their balance sheets through leasing.²⁸ Finally, hypothesis I implies that foreign operating levels should not change in response to the 1986 act since managers finance costlessly around the tax change.

If alternative hypothesis II is correct, substitute financial vehicles are not perfect, and consequently, the tax change raises the cost of capital in certain businesses. This increase in costs may encourage firms to cut back on their operations. We also might expect some effect on financing methods, as firms substitute away from debt and toward leasing. However, we would also expect a decline in investment and foreign operations, measured by foreign-produced foreign sales or even by firmwide costs of goods sold.

If the null hypothesis is correct, then firms do little to change their financing *or* operating patterns; instead, they simply bear the additional burden created by the tax change. If this is the case, then changes in capital structure, leasing, investment, foreign operations, and firmwide operations need bear no relation to firms' exposures to the interest allocation provisions of the 1986 act. How-

28. Operating leases (to which we refer) are not included on the balance sheet, and the associated lease payments are fully deductible against U.S. taxable income. Capital leases, on the other hand, *are* included on the balance sheet, and their associated lease payments are (as is true of debt) allocated for tax purposes between domestic and foreign sources by §861-8. We use measures of investment that include changes in capital leases but not in operating leases, and it is operating leases that are preferred by firms unable to take full advantage of lease tax deductions. See, e.g., Smith and Wakeman (1985) and Edwards and Mayer (1991).

ever, one would expect to observe an increase in *total* costs (and a decline in after-tax profits) that reflects the additional tax burden.

10.4.1 A Nonparametric Look at the Sample

Table 10.2 describes some aspects of the behavior of the sample of firms after 1986.²⁹ Firms are classified into two groups on the basis of fraction of foreign assets (above median and below median); within each group, they are further classified by excess foreign tax credit and deficit foreign tax credit status. Roughly half of the firms in the sample (51.4 percent) are classified as having excess foreign tax credits.

Firms that differ in the fraction of their assets held abroad may differ in other important observable and unobservable ways. The model presented in section 10.2 implies that the 1986 act raised the cost of debt-financed investments for firms with excess foreign tax credits and significant foreign assets. The behavior described in table 10.2 is consistent with the predictions of the alternative hypotheses. Firms with excess foreign tax credits exhibit slower mean growth (over 1986–91) of outstanding debt relative to 1986 assets, and slower mean growth of property, plant, and equipment, than do deficit credit firms. This pattern appears for multinational firms with small fractions of foreign assets (except for a negligible difference in debt changes for excess and deficit foreign tax credit firms with small amounts of foreign assets), but is considerably more dramatic for firms with high fractions of foreign assets.

Figure 10.1 illustrates the mean growth of debt relative to 1986 asset levels for firms in each cell reported in table 10.2. The figure suggests that excess foreign tax credits affect only those firms with significant foreign assets, which is consistent with the theory sketched in section 10.2. Furthermore, there is a marked difference between the cumulative growth of debt in excess foreign tax credit firms and that in deficit foreign tax credit firms. A similar pattern appears in firms' accumulation of property, plant, and equipment, as illustrated by figure 10.2. This figure indicates that the impact of excess foreign tax credits on the accumulation of property, plant, and equipment is most dramatic for firms with significant foreign assets as a fraction of total assets.

Alternative hypothesis I indicates that firms react to higher after-tax costs of debt by replacing debt with alternative financing devices. Earlier work by Collins and Shackelford (1992) calls attention to the impact of changes in interest allocation rules on firms' proclivities to issue preferred stock. Only a small fraction of firms are financed with preferred stock, but Collins and Shackelford argue that the use of preferred stock expanded after 1986, in part because of the rising after-tax cost of debt.

Table 10.3 describes the responses of firms in our sample to the changing incentives to issue preferred stock after 1986. The mean behavior of firms as

29. Tables 10.2 and 10.3 describe the behavior of the sample of 388 firms that did not exhibit 100 percent or greater change in assets in a year. The larger sample of 416 firms has moments that are very similar to those reported in tables 10.2 and 10.3.

Table 10.2 Debt and PPE Accumulation by Foreign Asset Concentration and FTC Status, 1986–91

Variable	Foreign Assets/Total Assets Below Median		Foreign Assets/Total Assets Above Median	
	Excess FTC	Deficit FTC	Excess FTC	Deficit FTC
Number of firms	97	96	92	101
Δ Debt/Assets				
Mean	0.13678	0.13426	0.10556	0.15447
Median	0.11705	0.05519	0.06016	0.14446
Standard deviation	0.28151	0.22383	0.12348	0.24886
Δ PPE/Assets				
Mean	0.13847	0.15538	0.13395	0.18940
Median	0.11121	0.07145	0.13104	0.14902
Standard deviation	0.24350	0.29645	0.22000	0.29366

Note: Firms are classified into cells based on foreign asset/total asset ratios in 1986, and by foreign tax credit (FTC) status as calculated over 1986–91. Δ Debt/Assets represents the difference between total debt in 1991 and total debt in 1986, divided by total assets in 1986. Δ PPE/Assets represents the difference between net property, plant, and equipment in 1991 and net property, plant, and equipment in 1986, divided by total assets in 1986.

Table 10.3 Changes in Preferred Stock by Foreign Asset Concentration and FTC Status, 1986–91

Variable	Foreign Assets/Total Assets Below Median		Foreign Assets/Total Assets Above Median	
	Excess FTC	Deficit FTC	Excess FTC	Deficit FTC
Number of firms	97	96	92	101
Δ Preferred stock/assets				
Mean	0.00221	0.00584	0.00080	0.00275
Median	0	0	0	0
Standard deviation	0.01839	0.06027	0.03005	0.04661
Number of increases	9	10	17	10
Number of decreases	16	14	12	17

Note: Firms are classified into cells based on foreign asset/total asset ratios in 1986, and by foreign tax credit (FTC) status as calculated over 1986–91. Δ Preferred Stock/Assets represents the difference between preferred stock outstanding in 1991 and preferred stock outstanding in 1986, divided by total assets in 1986. Number of increases indicates the number of firms in each cell for whom the difference between preferred stock outstanding in 1991 and preferred stock outstanding in 1986 is positive. Number of decreases indicates the number of firms for which the difference is negative.

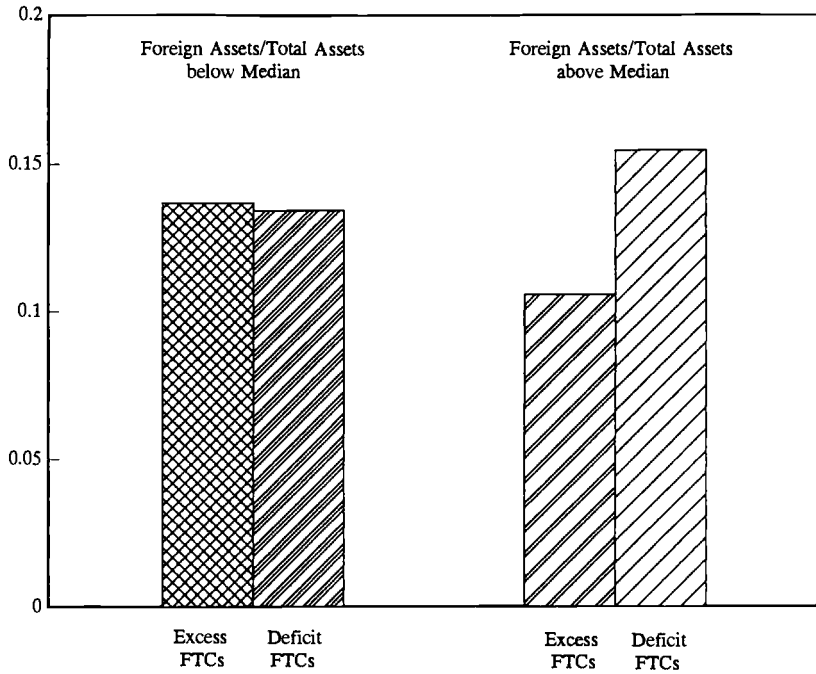


Fig. 10.1 Debt accumulation 1986–91 (as a fraction of 1986 assets), by tax status

Note: Bars measure the ratios of five-year changes (1986–91) in book values of debt to 1986 book assets. Entries depict this ratio for the firm with the median ratio in each cell: *left*, 193 firms had below-median ratios of foreign assets to total assets in 1986, of which 97 were classified as having excess foreign tax credits and 96 were classified as having deficit foreign tax credits; *right*, 193 firms had above-median ratios of foreign assets to total assets, of which 92 were classified as having excess foreign tax credits, and 101 as having deficit foreign tax credits.

reported in the table is not consistent with the hypothesis that tax considerations were responsible for a significant shift of financing away from debt and into preferred stock. The absence of an important effect in the means may reflect the omission of important variables that explain preferred stock issuances,³⁰ or may simply reflect the smallness of the fraction of the sample that ever issues preferred stock. One tidbit of evidence presented in table 10.3 is consistent with the theory of tax-motivated preferred stock issuances: excess foreign tax credit status is positively correlated with the fraction of high-foreign-asset firms that increase their outstanding preferred stock after 1986,

30. Collins and Shackelford (1992) include a number of additional explanatory variables in their regressions. Many of these additional variables, such as net operating loss status, are likely to influence preferred stock issuances, but most financial and operating variables are themselves endogenous to financing choices and may respond to unobservables that also influence financing decisions.

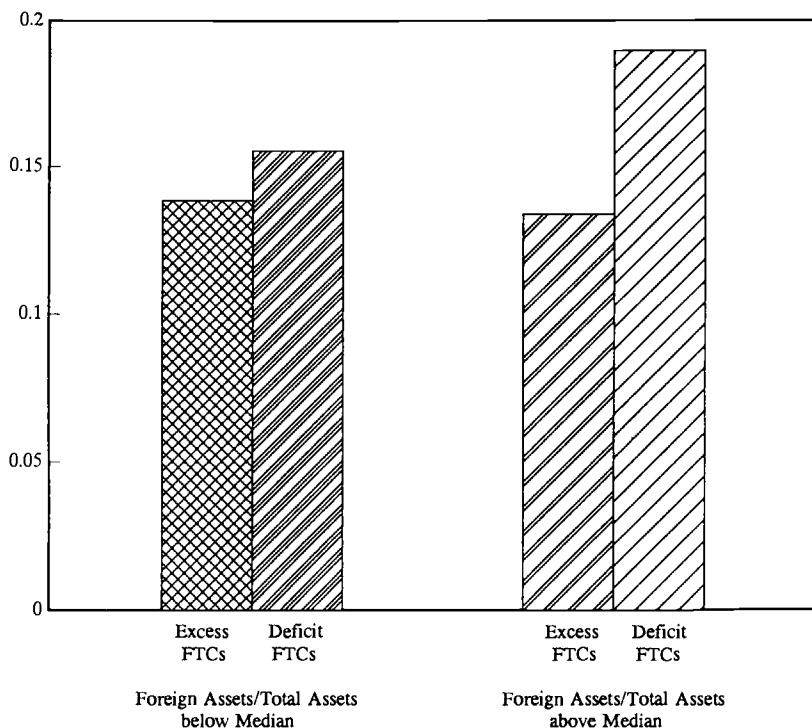


Fig. 10.2 PPE accumulation 1986–91 (as a fraction of 1986 assets), by tax status

Note: Bars measure the ratios of five-year changes (1986–91) in book values of property, plant, and equipment to 1986 book assets. Entries depict this ratio for the firm with the median ratio in each cell: *left*, 193 firms had below-median ratios of foreign assets to total assets in 1986, of which 97 were classified as having excess foreign tax credits and 96 were classified as having deficit foreign tax credits; *right*, 193 firms had above-median ratios of foreign assets to total assets, of which 92 were classified as having excess foreign tax credits, and 101 as having deficit foreign tax credits.

and negatively correlated with the fraction of high-foreign-asset firms that decrease their outstanding preferred stock after 1986. The reverse pattern appears for low-foreign-asset firms. Given the very small size of the sample of firms changing their preferred stock amounts, however, these correlations are no more than suggestive.

10.4.2 Capital Structure and Changes in Borrowing Patterns

Tables 10.4 and 10.5 report regressions of changes in capital structure, measured as the change in debt divided by beginning-of-period assets. The sample period used in the regressions reported in table 10.4 is the 1986–91 period, whereas the sample period used in the regressions reported in table 10.5 is 1984–86. All regressions are OLS.

Table 10.4 Debt Accumulation, 1986–91

Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.2256 (0.0311)	0.1907 (0.0281)	0.1893 (0.0293)		
FTC dummy	-0.0348 (0.0448)				
$[A^*/(A + A^*)]^2$		0.5243 (0.2737)	0.8858 (0.3309)	0.5469 (0.2765)	0.9237 (0.3354)
FTC dummy · $[A^*/(A + A^*)]^2$		-0.6410 (0.3247)	-0.9253 (0.3628)	-0.6724 (0.3288)	-0.9698 (0.3669)
TLCF/Assets			-0.2588 (0.1005)		-0.2791 (0.1012)
Industry dummies	No	No	No	Yes	Yes
Adjusted R^2	-0.001	0.006	0.021	0.010	0.027
N	416	416	387	416	376

Note: Standard errors are in parentheses. The columns report coefficients from OLS regressions in which the dependent variable is the ratio of the change in the book value of a firm's debt over 1986–91 to its total assets in 1986 (Δ Debt 1986–91/Assets 1986). See note to table 10.1 for other variables.

Table 10.5 Debt Accumulation, 1984–86

Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.1285 (0.0371)	0.1819 (0.0340)	0.1900 (0.0362)		
FTC dummy	0.0115 (0.0536)				
$[A^*/(A + A^*)]^2$		-0.7118 (0.3228)	-0.6585 (0.4048)	-0.7250 (0.3297)	-0.6844 (0.4150)
FTC dummy · $[A^*/(A + A^*)]^2$		0.2911 (0.3997)	0.2636 (0.4540)	0.2793 (0.4059)	0.2627 (0.4609)
TLCF/Assets			-0.1215 (0.1192)		-0.1178 (0.1215)
Industry dummies	No	No	No	Yes	Yes
Adjusted R^2	-0.002	0.009	0.008	-0.004	-0.006
N	386	386	362	386	362

Note: Standard errors are in parentheses. The columns report coefficients from OLS regressions in which the dependent variable is the ratio of the change in the book value of a firm's debt over 1984–86 to its total assets in 1986 (Δ Debt 1984–86/Assets 1986). See note to table 10.1 for other variables.

The first specification in table 10.4 regresses the change in debt from 1986 to 1991 (scaled by assets in 1986) on a constant and the foreign tax credit status dummy. The coefficient on the dummy term is negative as expected; however, it is not statistically significant. A more precise specification is that excess foreign tax credit firms should exhibit greater aversion to using debt the

higher are their ratios of foreign to total assets. The second regression in table 10.4 tests this specification by including both the (squared) ratio of foreign to total assets and an interaction term between this ratio and the foreign tax credit status dummy. Here, the coefficient of -0.64 on the interaction term indicates that a firm with excess foreign tax credits and half of its assets abroad reduces its debt accumulation by 16 percent ($-0.64(1/2)^2$) of assets over five years, or about 3 percent per year.

This coefficient on the interaction term becomes larger and more significant when (as in the regressions reported in col. [3]) TLCF is included as an explanatory variable. The introduction of industry dummy variables, intended to capture differential pressure on debt accumulation across industries, also raises the magnitude of the estimated coefficient that reflects the impact of interest allocation rules. In the specification reported in column (5), one that includes both TLCF and industry dummies, the estimated coefficient on the interaction term is -0.96 . This implies that the interest allocation rules encourage a firm with excess foreign tax credits and half of its assets abroad to reduce debt accumulation at an annual rate of 4.8 percent ($-0.96(1/2)^2/5$) of initial assets.

Table 10.5 reports estimated coefficients from regressions that repeat the same five specifications as those reported in table 10.4, except that the dependent variable is now the change in debt prior to the tax-law change (1984–86). If the results in table 10.4 are driven by unobserved, time-invariant, and firm-specific factors that are correlated with included tax variables, we would expect to find that the results reported in table 10.5 resemble those in table 10.4. Note, however, that this is not the case: the estimated coefficients on all of the explanatory variables (except TLCF) change sign and become insignificant. Thus, table 10.5 offers little support for the hypothesis that firm-specific unobservables are responsible for the results reported in table 10.4.³¹ A better interpretation of the results of tables 10.4 and 10.5 is that excess foreign tax credit firms tend to substitute away from debt finance. As expected, this appears to be particularly true for firms with larger ratios of foreign to total assets.

Table 10.6 presents estimated coefficients from regressions that examine changes in PPE from 1986 to 1991, scaled by 1986 assets. Right-hand-side specifications are similar to those used in table 10.4. The first specification reported in table 10.6 shows that investment rates differ by foreign tax credit status. While the coefficient on the foreign tax credit dummy variable is statistically negative, it is relatively small: excess foreign tax credit firms invest at rates that are about 1.5 percent ($-0.074/5$) lower per year. Note that, as before, the effect becomes larger when interacted with the ratio of foreign to total assets. For example, the second specification reports an interaction coefficient of -0.56 , implying that an excess foreign tax credit firm with half its assets

31. We ran the specifications presented in tables 10.4 and 10.5 for two smaller data samples that filter out those firms with year-on-year changes in assets of 100 and 50 percent, finding results that are similar to those above. However, in some cases the statistical significance of the parameter estimates was reduced.

Table 10.6 PPE Accumulation, 1986–91

Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.2358 (0.0266)	0.1844 (0.0241)	0.1848 (0.0251)		
FTC dummy	-0.0739 (0.0383)				
$[A^*/(A + A^*)]^2$		0.4592 (0.2344)	0.6469 (0.2837)	0.4032 (0.2366)	0.5888 (0.2869)
FTC dummy · $[A^*/(A + A^*)]^2$		-0.5613 (0.2781)	-0.6892 (0.3112)	-0.5545 (0.2814)	-0.6855 (0.3138)
TLCF/Assets			-0.2057 (0.0861)		-0.2181 (0.0824)
Industry dummies	No	No	No	Yes	Yes
Adjusted R^2	0.007	0.007	0.016	0.013	0.027
N	414	414	386	414	386

Note: Standard errors are in parentheses. The columns report coefficients from OLS regressions in which the dependent variable is the ratio of the change in the book value of a firm's property, plant, and equipment over 1986–91 to its total assets in 1986 (Δ PPE 1986–91/Assets 1986). See note to table 10.1 for other variables.

abroad invests at an annual rate of 2.8 percent ($-0.56 (1/2)^2/5$) lower than a comparable deficit foreign tax credit firm.³² When industry dummies and TLCF are added to the specification, the coefficient increases in magnitude, reaching -0.69 in the specification reported in column (5). The same regressions, when run using data on PPE accumulation over the 1984–86 time period, produce estimated interaction coefficients that are positive rather than negative (though not significantly different from zero). Table 10.7 presents estimated coefficients from these regressions.

There are two possible interpretations of the tendency for firms with excess foreign tax credits and high ratios of foreign to total assets to accumulate PPE more slowly than do other firms. The first is that the loss of debt tax shields experienced by these firms results in a higher overall cost of capital and, consequently, a lower level of investment. Of course, to the extent that firms substitute away from debt finance toward cheaper after-tax financing sources, these substitutions can mitigate the increased cost of capital. The second interpretation is that firms do not face *any* increase in the cost of *employing* capital, but that they reduce PPE expenditures by leasing rather than owning capital. Leases allow the lessor to use the debt tax shield from debt financing of PPE since the capital cost component of lease prices is not allocated between foreign and domestic source. Thus, leases may represent low-cost devices to preserve the tax shield for a given amount of PPE. This suggests that excess foreign tax credit firms—particularly those with higher foreign asset ratios—had

32. As above, percentage figures are expressed relative to beginning-of-period assets.

Table 10.7 PPE Accumulation, 1984–86

Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.0825 (0.0143)	0.0928 (0.0132)	0.0967 (0.0138)		
FTC dummy	0.0104 (0.0207)				
$[A^*/(A + A^*)]^2$		-0.1512 (0.1250)	-0.0765 (0.1536)	-0.1418 (0.1236)	-0.0765 (0.1524)
FTC dummy · $[A^*/(A + A^*)]^2$		0.1888 (0.1547)	0.1568 (0.1721)	0.1183 (0.1520)	0.0973 (0.1691)
TLCF/Assets			-0.1281 (0.0452)		-0.1343 (0.0446)
Industry dummies	No	No	No	Yes	Yes
Adjusted R^2	-0.002	0.000	0.021	0.051	0.070
N	385	385	361	385	361

Note: Standard errors are in parentheses. The columns report coefficients from OLS regressions in which the dependent variable is the ratio of the change in the book value of a firm's property, plant and equipment over 1984–86 to its total assets in 1986 (Δ PPE 1984–86/Assets 1986). See note to table 10.1 for other variables.

incentives to expand more rapidly the use of leases than did deficit foreign tax credit firms.

Table 10.8 reports our attempts to test this latter interpretation. We regress a measure of *unexpected* increases in lease commitments over the 1986–91 period on the same explanatory variables used in earlier regressions. The dependent variable is unexpected increases in leases because that variable measures the differential effect of the 1986 tax act. It is unlikely that the interest allocation rules enacted at the end of 1986 were understood in detail prior to that year. In any case, to the extent that such changes were anticipated, the power of our tests is reduced. In order to measure unexpected increases in lease commitments, the numerator of the dependent variable equals the difference between actual lease payments in each year from 1986 to 1990 and the five-year lease commitments as of December 1985. This difference is scaled by 1986 assets. Table 10.8 reports the results from regressing this measure on right-hand-side variables similar to those in previous tables.

The first specification uses only the foreign tax credit dummy variable, finding there to be a small difference between excess foreign tax credit and deficit foreign tax credit firms. Similarly, both the foreign asset ratio and interaction term are statistically insignificant when added to the regression (as reported in col. [3]). One possibility is that the collinearity between these two terms, particularly the collinearity introduced by errors in measurement of the ratio of foreign assets to total assets, is responsible for the insignificance of individual coefficients. Column (2) reports estimated coefficients from specifications that omit the foreign-to-total asset ratio term. Omitting this ratio imposes the re-

Table 10.8 New Leases, 1986–91 (without industry dummies)

Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.4694 (0.0690)	0.3871 (0.0530)	0.3608 (0.0611)	0.4710 (0.0891)	0.3842 (0.0561)
FTC dummy	-0.0768 (0.0982)			-0.2071 (0.1221)	
$[A^*/(A + A^*)]^2$			0.5597 (0.6473)	-0.0205 (0.7303)	
FTC dummy · $[A^*/(A + A^*)]^2$		0.9994 (0.4681)	0.5309 (0.7162)	1.4469 (0.8952)	1.0152 (0.4793)
TLCF/Assets					0.1789 (0.1946)
Industry dummies	No	No	No	No	No
Adjusted R^2	-0.001	0.012	0.011	0.018	0.013
N	286	286	286	286	268

Note: Standard errors are in parentheses. The columns report coefficients from OLS regressions in which the dependent variable is a ratio: the numerator of the ratio is the difference between a firm's leases of property, plant, and equipment over 1986–91 and its preexisting lease commitments at year-end 1986; the denominator of the ratio is the firm's total assets at year-end 1986 (New leases 1986–91/Assets 1986). See note to table 10.1 for other variables.

striction that there is no relationship between foreign assets and leases among deficit foreign tax credit firms. This restriction cannot be rejected by the data since the estimated coefficient on the ratio of foreign assets in the specification reported in column (3) is statistically indistinguishable from zero.

The estimates presented in column (2) indicate that the interaction-term coefficient increases in magnitude and becomes statistically significant once the asset ratio restriction is imposed. The interaction coefficient reported in column (2) implies that, among excess foreign tax credit firms, a 50 percent difference in the fraction of total assets that are foreign held is associated with an average difference in unexpected leases over five years of 25 percent $(1.00/(1/2)^2)$ of assets, or about 5 percent per year.

The estimated coefficient on the interaction term is also large and marginally significant when the simple foreign tax credit status dummy variable is added (as in the specification reported in col. [4]). These results therefore suggest that deficit foreign tax credit firms on average do more leasing than excess foreign tax credit firms (the reverse of what one might expect); however, excess foreign tax credit firms with larger ratios of assets held abroad show a stronger tendency to lease. Overall, table 10.8 provides some evidence that excess foreign tax credit firms with high ratios of assets abroad tend to engage in additional, unexpected leasing subsequent to 1986. Table 10.9 reports estimated coefficients from identical regressions that include industry dummy variables; the results are similar, though of lower statistical significance.

To the extent that firms increase their leasing to avoid higher debt costs for

Table 10.9 New Leases, 1986–91 (with industry dummies)

Variable	(1)	(2)	(3)	(4)	(5)
Constant					
FTC dummy	-0.0910 (0.0845)			-0.2048 (0.1049)	
$[A*(A + A^*)]^2$			0.0972 (0.5589)	-0.4883 (0.6318)	
FTC dummy · $[A*(A + A^*)]^2$		0.5654 (0.4157)	0.4845 (0.6247)	1.3867 (0.7744)	0.6105 (0.4306)
TLCF/Assets					0.1114 (0.1683)
Industry dummies	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.281	0.283	0.281	0.288	0.268
N	286	286	286	286	268

Note: Standard errors are in parentheses. The columns report coefficients from OLS regressions in which the dependent variable is a ratio: the numerator of the ratio is the difference between a firm's leases of property, plant, and equipment over 1986–91 and its preexisting lease commitments at year-end 1986; the denominator of the ratio is the firm's total assets at year-end 1986 (New leases 1986–91/Assets 1986). See note to table 10.1 for other variables.

on-balance-sheet assets, they are able to mitigate tax-induced changes in financing costs. The results reported in table 10.8 therefore provide some support for alternative hypothesis I, although they by no means rule out hypothesis II. Indeed, the evidence presented in tables 10.4–10.9 suggests that financing responses did occur, but not that operating responses *did not* occur. Thus, there appears to be evidence against the null hypothesis, and some evidence in favor of hypothesis I, but one cannot rule out hypothesis II.

10.4.3 Changes in Operating Patterns

One way to obtain additional evidence on hypotheses I and II is to investigate the level of firms' foreign operations. For example, by examining changes in foreign sales, and foreign costs of production (with and without financing costs), one might gain a better sense for whether excess foreign tax credit firms changed their operations as a result of higher capital costs. Unfortunately, relatively few data on firms' foreign operations are available. In this section we use different measures of operations, although in some cases we are forced to employ data that combine foreign and domestic operating information.

The first variable that measures changes in foreign operations is foreign-produced foreign sales. This variable is the difference between sales by foreign affiliates and intrafirm exports from the United States. This variable identifies firms that avoid higher capital costs by substituting away from foreign assets toward domestic assets, as reflected by a proclivity to service foreign markets by exporting rather than using local production.

Tables 10.10 and 10.11 report estimated coefficients from regressions that

Table 10.10 Foreign-Produced Foreign Sales, 1986–91

Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.3389 (0.0486)	0.3579 (0.0419)	0.4169 (0.0562)		
FTC dummy	-0.0572 (0.0702)				
Debt/Assets			-0.3319 (0.2110)		-0.2864 (0.2095)
FTC dummy · (Debt/Assets)		-0.4151 (0.2069)	-0.2442 (0.2334)	-0.3043 (0.1927)	-0.1583 (0.2201)
TLCF/Assets				-0.0979 (0.1340)	-0.0766 (0.1347)
Industry dummies	No	No	No	Yes	Yes
Adjusted R^2	-0.001	0.007	0.011	0.003	0.013
N	409	409	409	381	381

Note: Standard errors are in parentheses. The columns report coefficients from OLS regressions in which the dependent variable is the ratio of the change over 1986–91 in a firm's foreign-produced foreign sales (the difference between total foreign sales and exports from the United States) to total assets at year-end 1986 (Δ Foreign sales 1986–91/Assets 1986). See note to table 10.1 for other variables.

Table 10.11 Foreign-Produced Foreign Sales, 1986–91 (with additional variable)

Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.2033 (0.0697)	0.2623 (0.0789)			
Debt/Assets		-0.3302 (0.2093)			-0.2321 (0.2085)
FTC dummy · (Debt/Assets)	-0.4045 (0.2053)	-0.2344 (0.2315)	-0.3747 (0.2076)	-0.2936 (0.1908)	-0.1760 (0.2182)
TLCF/Assets				-0.1890 (0.1362)	-0.1685 (0.1374)
Foreign assets/ Total assets	0.6231 (0.2254)	0.6220 (0.2249)	0.5911 (0.2272)	0.6502 (0.2215)	0.6273 (0.2224)
Industry dummies	No	No	Yes	Yes	Yes
Adjusted R^2	0.023	0.027	0.033	0.023	0.013
N	409	409	409	381	381

Note: Standard errors are in parentheses. The columns report coefficients from OLS regressions in which the dependent variable is the ratio of the change over 1986–91 in a firm's foreign-produced foreign sales (the difference between total foreign sales and exports from the United States) to total assets at year-end 1986 (Δ Foreign sales 1986–91/Assets 1986). Foreign Assets/Total Assets is the ratio of book values of foreign assets and total assets in 1986. See note to table 10.1 for other variables.

use foreign-produced foreign sales as the dependent variable. In the regressions reported in table 10.10, the independent variables are similar to those presented in tables 10.4–10.9, with the difference that debt/assets is used as a regressor in table 10.10 in place of foreign assets/total assets. The reason for this substitution is that the margin of substitution tested in these regressions is one in which greater indebtedness raises the cost of each dollar of foreign assets, and not one in which the foreign asset ratio is appropriately held constant. If the tax change induces operating effects, the reason must be that firms find it costly to substitute away from debt financing. Thus, excess foreign tax credit firms with high levels of debt in 1986 will not, in these instances, be able inexpensively to reconstitute their capital structures, and thus are more likely to reduce their foreign-produced foreign sales.

The first specification reported in table 10.10 indicates that excess foreign tax credit firms on average reduce foreign-produced sales by about 5.7 percent over five years relative to deficit firms; this effect is not, however, statistically different from zero. Column (2) reports estimated coefficients from a more precise specification in which the foreign tax credit dummy variable is interacted with the ratio of debt to total assets. The estimated coefficient on this interaction term is significant and indicates that firms with excess foreign tax credits and 25 percent debt-to-asset ratios reduced their foreign sales by 2 percent per year (relative to assets) after 1986. Columns (3)–(5) of table 10.10 report the results of alternative specifications in which the estimated interaction effect remains negative while exhibiting reduced statistical significance.

Table 10.11 presents similar regressions that include an additional variable conditioning on the amount of debt in the capital structure as of 1986. The results are similar to those presented in table 10.10. Together, the results reported in tables 10.10 and 10.11 provide mild support for hypothesis II above, i.e., that firms responded to the tax change by cutting back on their foreign operations instead of fully absorbing the increase in capital costs.

One logical implication of the preceding analysis is that the interest allocation rules, by raising the cost of domestic operations and raising the cost of foreign operations, depress the level of total business operations by affected firms. Since the magnitude of total business operations is influenced by many important nontax factors, and, as a practical matter, can be measured in more than one way, this is a challenging hypothesis to test.

Table 10.12 presents estimated coefficients from regressions in which the dependent variables are changes in costs of goods sold between 1986 and 1991 (scaled by assets in 1986). The cost of goods sold variable includes foreign and domestic costs. In order to simplify matters, the independent variables are the same as those used in the regressions reported in table 10.4. Table 10.12 indicates that the tax effects take the expected negative sign—firms affected by the interest allocation rules reduced the scales of their operations—but the estimated coefficients are insignificant in every case. The statistical insignificance of the coefficients no doubt reflects, at least in part, the impossibility of

Table 10.12 Change in Scale of Operations, 1986–91

Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.5560 (0.0660)	0.4561 (0.0599)	0.4485 (0.0632)		
FTC dummy	-0.1267 (0.0952)				
$[A^*/(A + A^*)]^2$		1.0492 (0.5829)	1.7204 (0.7145)	0.9010 (0.5840)	1.5615 (0.7186)
FTC dummy · $[A^*/(A + A^*)]^2$		-0.9659 (0.6914)	-1.4156 (0.7835)	-0.9265 (0.6945)	-1.3650 (0.7861)
TLCF/Assets			-0.4890 (0.2170)		-0.4981 (0.2167)
Industry dummies	No	No	No	Yes	Yes
Adjusted R^2	0.002	0.003	0.014	0.024	0.035
N	416	416	387	416	387

Note: Standard errors are in parentheses. The columns report coefficients from OLS regressions in which the dependent variable is the ratio of the change in a firm's total (domestic plus foreign) cost of goods sold over 1986–91 to its total assets in 1986 ($\Delta\text{Cost } 1986\text{--}91/\text{Assets } 1986$). See note to table 10.1 for other variables.

controlling for many important factors that influence changes in costs of goods sold over this period. The evidence is certainly consistent with a sizable impact of interest allocation rules on scales of operation (the point estimate in the regression reported in col. [3] of table 10.12 implies that costs of goods sold were reduced by 2 percent per year, relative to assets, for affected firms with 25 percent foreign assets), but it is not possible to reject the hypothesis that there was no impact on operations.

Table 10.13 presents the results of specifications that repeat this estimation, taking as the dependent variable changes in costs of goods sold over 1984–86. Again, the tax terms are insignificant, though they are of opposite sign to those reported in table 10.12. Taken together, the regressions reported in tables 10.12 and 10.13 provide suggestive but inconclusive (from a statistical standpoint) evidence that interest allocation rules may influence the overall magnitude of firm operations.

10.5 Conclusion

This paper examines the impact of interest allocation rules introduced by the Tax Reform Act of 1986. The incomplete tax deductibility of parent-company interest expenses appears to reduce significantly borrowing and investing by excess foreign tax credit firms. In addition, excess foreign tax credit firms affected by the interest allocation rules are the most likely to undertake new operating leases, presumably in lieu of acquiring new capital. These results are consistent with the hypothesis that firms substitute away from debt when it

Table 10.13 Change in Scale of Operations, 1984–86

Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.2058 (0.0571)	0.4561 (0.0599)	0.4485 (0.0632)		
FTC dummy	-0.0645 (0.0826)				
$[A^*/(A + A^*)]^2$		-0.5799 (0.5001)	-0.3883 (0.6263)	-0.6469 (0.5059)	-0.4708 (0.6348)
FTC dummy · $[A^*/(A + A^*)]^2$		0.2256 (0.6189)	0.1216 (0.7020)	0.2388 (0.6224)	0.1419 (0.7044)
TLCF/Assets			-0.3072 (0.1844)		-0.3199 (0.1856)
Industry dummies	No	No	No	Yes	Yes
Adjusted R^2	0.002	-0.001	0.004	0.005	0.013
N	385	385	361	385	361

Note: Standard errors are in parentheses. The columns report coefficients from OLS regressions in which the dependent variable is the ratio of the change in a firm's total (domestic plus foreign) cost of goods sold over 1984–86 to its total assets in 1986 ($\Delta\text{Cost } 1984\text{--}86/\text{Assets } 1986$). See note to table 10.1 for other variables.

becomes more expensive, as well as the hypothesis that loss of interest tax deductibility can increase a firm's cost of capital.

Note, however, that the size and significance of the effects on borrowing, investment spending, and leasing do not imply that interest allocation rules necessarily impose large *costs* on excess foreign tax credit firms. All of the results just mentioned might appear even though nondebt financing substitutes are available at essentially the same cost as debt finance. If, for example, leasing can be done at the same after-tax cost as buying, then the tax law change may just encourage low-cost substitution.

Of course, many of the results are also consistent with the proposition that excess foreign tax credit firms face relatively greater costs of capital. Firms may choose to fund property, plant, and equipment off the balance sheet as a way of capturing *part* of the otherwise lost tax shields. The portion that cannot be captured is a real cost. This may lead excess foreign tax credit firms to underinvest, to grow more slowly, and to restrict the scope of foreign operations; this behavior, in turn, reduces their needs for debt financing. Some of the results reported in the paper suggest that firms affected by the change in interest allocation rules reduced their foreign and total operations in response. The tax law change may also skew investments by affected firms away from businesses in which the tax deductions are critical to competitiveness. In this way, the loss of U.S. multinational tax shields could represent substantial firm-specific costs.

References

- Altshuler, Rosanne, and Jack Mintz. 1994. U.S. interest allocation rules: Effects and policy. NBER Working Paper no. 4712. Cambridge, Mass.: National Bureau of Economic Research, April.
- Collins, Julie H., and Douglas A. Shackelford. 1992. Foreign tax credit limitations and preferred stock issuances. *Journal of Accounting Research*, 30:103–23.
- Edwards, J. S. S., and C. P. Mayer. 1991. Leasing, taxes, and the cost of capital. *Journal of Public Economics* 44:173–97.
- Froot, Kenneth A., and James R. Hines Jr. 1994. Losing interest: Interest allocation rules and the cost of debt finance. Harvard University. Mimeograph.
- Gordon, Robert H., and Burton G. Malkiel. 1981. Corporation finance. In *How taxes affect economic behavior*, ed. Henry J. Aaron and Joseph A. Pechman. Washington, D.C.: Brookings Institution.
- Hartman, David G. 1985. Tax policy and foreign direct investment. *Journal of Public Economics* 26:107–21.
- Hines, James R., Jr. 1991. The flight paths of migratory corporations. *Journal of Accounting, Auditing, and Finance* 6:447–79.
- Hines, James R., Jr., and R. Glenn Hubbard. 1990. Coming home to America: Dividend repatriations by U.S. multinationals. In *Taxation in the global economy*, ed. Assaf Razin and Joel Slemrod, 161–200. Chicago: University of Chicago Press.
- Hines, James R., Jr., and Eric M. Rice. 1994. Fiscal paradise: Foreign tax havens and American business. *Quarterly Journal of Economics* 109:149–82.
- Miller, Merton H. 1977. Debt and taxes. *Journal of Finance* 32:261–75.
- Scholes, Myron S., and Mark A. Wolfson. 1992. *Taxes and business strategy: A planning approach*. Englewood Cliffs, N.J.: Prentice Hall.
- Smith, Clifford W., Jr., and L. MacDonald Wakeman. 1985. Determinants of corporate leasing policy. *Journal of Finance* 40:895–908.
- Stiglitz, Joseph E. 1973. Taxation, corporate financial policy, and the cost of capital. *Journal of Public Economics* 2:1–34.

Comment Julie H. Collins

I applaud Froot and Hines for successfully embarking on a project that many in the international research community, including myself, have contemplated for some time. Froot and Hines investigate whether the more stringent interest allocation rules enacted in the Tax Reform Act of 1986 resulted in decreased domestic debt growth for U.S. multinationals. The most surprising aspect of their study is that their findings support such a conclusion despite the limitations of their data (gathered from publicly available financial statement information), which bias against such a finding.

As Froot and Hines illustrate, the interest allocation rules raise the cost of

domestic debt only. However, Froot and Hines are able only to measure changes in total debt (*domestic plus foreign*) of the worldwide consolidated entity.¹ Their primary dependent variable thus is measured as $(\text{Worldwide debt}_{91} - \text{Worldwide debt}_{86}) / \text{Assets}_{86}$. Examining changes in worldwide rather than domestic debt is particularly problematic because, first, as Froot and Hines acknowledge, the asymmetric treatment of domestic and foreign interest expense can encourage firms to finance their foreign subsidiaries with unrelated-party debt issued by the foreign subsidiary or with debt from the U.S. parent (often referred to as debt pushdowns) rather than parent equity. Such behavior would leave unchanged the total debt of the consolidated entity. Altshuler and Mintz (1994) suggest that U.S. multinationals in excess credit positions increased their foreign borrowings in response to the more stringent interest allocation rules. Thus, one would not necessarily expect a dampened growth in domestic debt to translate into a dampened growth in worldwide debt.²

Second, to the extent that excess credit firms have a greater proportion of their worldwide debt denominated in a foreign currency, exchange rate movements alone could give the appearance of faster debt growth. Since the dollar tended to weaken during this time period, debt denominated in a foreign currency and translated to U.S. dollars for financial reporting purposes likely appears larger in 1991 than 1986.³

Third, in 1986 U.S. multinationals were not required to consolidate their financing subsidiaries in their worldwide financial statements. However, beginning in 1988, U.S. accounting principles required the assets and liabilities of these subsidiaries be reflected in financial statements. Thus, finance subsidiary debt could be included in 1991 data, and both finance subsidiary assets and debt could be excluded from 1986 data. If firms with unconsolidated financing subsidiaries in 1986 are more likely excess credit firms, their debt likely appears to grow faster from 1986 to 1991 solely as a result of the consolidation.⁴

Nevertheless, despite these three potential serious biases against the predicted findings, Froot and Hines document a negative relation between

1. Foreign debt is defined here as debt with the associated interest deductible in a foreign country. It does not necessarily correspond to the currency the debt is denominated in, and it cannot be separately determined from publicly available financial statements.

2. Although Collins and Shackelford (1992) focus on the issuance of preferred stock in response to domestic interest allocation, we do not find a relation between the 1986–89 change in worldwide debt and the ratio of foreign assets to worldwide assets (our proxy for potential excess foreign tax credits) in a sensitivity test examining 1989 Fortune 100 firms. In our discussion (1992, 117), we note that the excess foreign tax credit proxy is expected to be negatively related to domestic debt but positively related to foreign debt and hence that we have no clear *ex ante* expectation with regard to the relation to worldwide debt.

3. E.g., one billion of debt denominated in deutsche marks would translate to approximately \$520 million at the end of 1986 and \$659 million at the end of 1991.

4. E.g., Aluminum Company of America, Amoco, Coca-Cola, Dow Chemical, Ford, General Electric, Philip Morris, and Xerox had unconsolidated finance subsidiaries in 1986. This is a non-random, incomplete list of companies and is provided only for illustrative purposes.

1986–91 debt growth and excess credit position. Thus, in many respects, Froot and Hines's results tell a more powerful story than is apparent at first blush.

Correlated omitted variables are a menace to any cross-sectional study. This is particularly the case here, where we are examining cross-sectional changes in capital structure or more specifically debt growth. Froot and Hines attenuate this concern by controlling for two firm-specific characteristics: industry and tax loss carryforward. Both are crucial, because debt-to-equity ratios and debt growth to assets are expected to vary by industry and U.S. taxpaying status.

In addition, Froot and Hines repeat the 1986–89 tests (see table 10.4) for 1984–86 changes in debt (see table 10.5). It is interesting to note that the only measure that changes between these two tables is the numerator of the dependent variable. The denominator of the dependent variable and all independent variables retain their 1986–91 observation period values. However, in table 10.5 the FTC dummy, the foreign assets to worldwide assets squared term, and the interaction of the two all reverse signs from those shown in table 10.4, and the asset squared term, rather than the interaction term, generally is significant in table 10.5. Given this rather peculiar pattern, which reemerges in subsequent analyses, it would be interesting to determine sensitivity to other specifications. For instance, what, if any, alteration in the results occurs if pre-1986 debt growth simply is added as a control variable in table 10.4 or if the average annual debt growth rates are computed for pre- and post-1986 periods and the dependent variable in table 10.4 is the difference between the two? Also, are the table 10.5 results sensitive to respecifying the dependent variable denominator and the independent variables to correspond to the 1984–86 time period?

Other potentially important correlated omitted variables that Froot and Hines do not control for in this study include firm growth and maturity and mergers and acquisitions. Demand for capital obviously is a function of investment opportunities. In a related paper, Froot and Hines (1994) interact 1986–91 asset growth and an excess foreign tax credit dummy and determine that excess foreign tax credit firms accumulate less debt for a given rate of asset growth. However, it also would be interesting to investigate the propensity of excess foreign tax credit firms to finance new investment through retained earnings. Firms operating in high-tax countries ($t_f > t_{US}$) and with a greater proportion of their worldwide assets located overseas could be more mature and hence have greater sources of internal capital than less mature firms.

Twenty (seven) percent of Froot and Hines's sample of 416 firms experience a greater than 50 (100) percent year-to-year change in assets in at least one year during the 1986–91 period. Thus, the 1991 debt numbers of these firms reflect substantially different operating entities than the 1986 debt and asset amounts. Froot and Hines elect to include these observations in the reported tests and note in footnote 31 that the statistical significance of the parameter estimates reported in tables 10.4 and 10.5 are reduced in some cases when these observations are excluded. Perhaps, it would be more informative to con-

tinue to use the full sample and add a mergers-and-acquisition control variable to the model specifications. The reader is left questioning what, if any, negative correlation exists between the 1986–91 debt growth rates of firms involved in substantial mergers and acquisitions and firms with excess foreign tax credits.

Two additional minor sensitivity tests may be warranted. Froot and Hines indicate in the paper and elaborate in footnote 2 that firms paying the alternative minimum tax (AMT) face idiosyncratic tax incentives with regard to debt and interest deductibility. However, it does not appear that AMT firms are excluded from the empirical analyses. Perhaps a control variable could be added to the model specification indicating firms paying AMT for some threshold number of years during the 1986–91 observation period. In addition, it may be of interest to separately examine current and long-term debt growth in the dependent variable.

Although my prior comments focus exclusively on what I perceive as the primary tests in the paper (tables 10.4 and 10.5), Froot and Hines commendably extend their analyses to examine the impact of changes in the interest allocation rules on preferred stock financing, investment spending, lease commitments, and foreign operating levels. These tests expand upon the notion that firms experiencing a meaningful increase in the cost of debt capital not only reduce debt but also substitute other forms of financing (preferred stock or operating leases) and/or make operational adjustments, such as reducing foreign activities.

Unlike Collins and Shackelford (1992), Froot and Hines do not find an increased proclivity to issue preferred stock among firms most likely affected by the interest allocation rule changes. This discrepancy likely occurs because of differences in sample firms and observation windows. Shackelford and I focus on the 1989 Fortune 100 companies. Short-term redeemable preferred stock (commonly issued for 49 days and often referred to as dutch-auction-rate preferred stock) is analogous to and a very attractive substitute for short-term debt or commercial paper. However, access to the dutch-auction preferred stock market generally is restricted to major U.S. multinationals (“blue-chip” companies). Froot and Hines’s sample, which likely includes our sample of approximately 100 companies, as well as approximately 300 other companies, may be too diffuse around the handful of blue-chip companies for which it is economically viable to substitute preferred stock for debt to replicate our results.⁵ In addition, Froot and Hines compare 1991 and 1986 preferred stock outstanding, and we compare 1989 and 1986 preferred stock outstanding. It is possible that some U.S. multinationals responded to the changes in the interest alloca-

5. Recall that since dividends paid on preferred stock are not deductible, preferred stock only becomes an attractive substitute for debt, which offers a diminished but still positive tax shield for excess credit firms, if the preferred stock issuer can capture a sufficient portion of the preferred stock implicit tax subsidy. This subsidy is generated by the dividends-received deduction available to corporate investors. See Collins and Shackelford (1992, 111–13) for further elaboration.

tion rules by issuing preferred stock, but the stock is no longer outstanding at the end of 1991. I am aware of at least one such case: Coca-Cola issued \$300 million of auction-rate preferred stock in 1988 and redeemed it in late 1990, stating that the preferred stock was no longer needed to minimize excess foreign tax credits (Collins and Shackelford 1992, 112–13).

I found the property, plant, and equipment (PPE) and lease commitment investigations particularly interesting. Froot and Hines note two possible interpretations of their PPE results. Excess credit firms with high foreign-to-total asset ratios may engage in lower levels of investment or may reduce PPE expenditures by leasing rather than owning capital assets. Froot and Hines then follow through for the reader by investigating whether excess credit firms engaged in significantly more *unexpected* leasing after 1986. The dependent variable is measured cleverly by subtracting the five-year lease commitments as of December 1985 from the actual lease payments in each year from 1986 to 1990. Ideally, we would control for *ex ante* anticipated behavior (absent our treatment effect) in all our research designs. However, this information is rarely available, as it is in this case.

I was somewhat perplexed by the investigation of changes in firms' operating behavior or level of foreign activities. Froot and Hines indicate that firms may respond to higher capital costs induced by the interest allocation rule changes by servicing foreign markets with U.S. exports rather than foreign production. The tax incentives are somewhat more detailed than those alluded to in the paper. The foreign tax credit rules generally allow U.S. multinationals to treat 50 percent of their export earnings as foreign-source income, thus allowing excess foreign tax credit multinationals to effectively exempt 50 percent of their export earnings from tax.⁶ Kemsley (1995) examines ratios of U.S. exports to unaffiliated customers to foreign-produced sales and provides convincing evidence that excess foreign tax credit firms respond to this incentive by substituting exports for foreign production. Thus, Froot and Hines may capture a somewhat incomplete glimpse of whether exports are being substituted for foreign production by simply examining 1986–91 changes in foreign-produced sales.

In conclusion, this paper meaningfully contributes to the international tax literature and genre of research examining the impact of taxes on capital structure and operating decisions. Although I suggest that the research community continue to explore the effect of additional correlated omitted variables on the robustness of these findings, I must reiterate that, given the data hurdles encountered in this study, Froot and Hines provide more powerful evidence of a decline in U.S. multinational domestic debt as a result of the interest allocation rule changes than may be apparent at first blush.

6. See *Internal Revenue Code* §863(b) and the related Treasury regulations.

References

- Altshuler, R., and J. Mintz. 1994. U.S. interest allocation rules: Effects and policy. NBER Working Paper no. 4712. Cambridge, Mass.: National Bureau of Economic Research, April.
- Collins, J., and D. Shackelford. 1992. Foreign tax credit limitations and preferred stock issuances. *Journal of Accounting Research* 30:103–24.
- Froot, K., and J. Hines. 1994. Losing interest: Interest allocation rules and the cost of debt finance. Harvard University. Mimeograph.
- Kemsley, D. 1995. The effect of taxes on the choice between exports and foreign production. Working Paper. University of North Carolina—Chapel Hill.