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ABSTRACT

The 1986 Tax Act in the U.S. gradually reduced corporate tax rates from 46 percent prior to the Act to 34 percent by the middle of 1988. This reduction gave firms an incentive, in 1986 and 1987, to shift taxable income to future years when tax rates would be lower. There are substantial impediments, however, to shifting taxable income across periods (notably, offsetting tax consequences to other contracting parties and a host of nontax costs), and it becomes an empirical question as to whether the benefits of shifting taxable income are sufficient to overcome the impediments. This paper examines whether firms deferred income recognition and/or accelerated expense recognition in anticipation of these declining tax rates. We find statistically significant evidence that firms shifted gross margin from the quarter immediately preceding and anticipated decrease in tax rates to the next quarter. We estimate that, on average, the 812 firms in our sample saved approximately five hundred thousand dollars in taxes by deferring sales. At a gross margin rate of one-third, this amounts to nearly twenty billion dollars of shifted sales for our sample firms.

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1. Introduction

In this paper, we investigate whether and how firms shifted income over time in response to a known schedule of declining tax rates. The content of our investigation is the 1986 Tax Act which (among many other changes) reduced corporate tax rates from a maximum of 46% to 34% over a period of two years. Tax rates for fiscal years ending in 1987 and 1988 were blends of the new and old rates, and the tax rate phase-in for a given firm was a function of fiscal year-end. For example, on January 1, 1987, the tax rate dropped from 46% to 40% for December fiscal year-end firms (hereafter, December firms), but remained unchanged for all other firms. Similarly, on July 1, 1987, the tax rate declined from 46% to 34% for June firms, but remained unchanged for all other firms.[1] Thus, income earned at the same calendar time by different firms was taxed at different rates simply by virtue of differences in fiscal year-ends. For example, during the first calendar quarter of 1987, income was taxed at 40% for December firms but at 46% for June firms.[2] Thus, during the fourth calendar quarter of 1986, December firms, but not June firms, had an incentive to shift income forward one quarter. Starting with the fourth calendar quarter of 1986, we consider income shifting behavior during seven consecutive quarters when some firms had a tax incentive to shift income forward one quarter while others did not.

Firms could defer income in anticipation of these tax-rate declines by, for example, postponing sales, accelerating research and development expenditures, accelerating advertising campaigns, and accelerating pension contributions. We suspect, however, that the choice of income-shifting strategy depends on certain time-of-year considerations. For example, deferring sales revenue at the end of

the year should give rise to lower non tax costs than doing so early in the year. On the other hand, certain expense items can be accelerated without incurring significant non tax costs. Because both the net tax benefits and the transaction costs associated with shifting taxable revenues across periods can differ significantly from the benefits and costs of shifting tax deductible expenditures, we examine firms' propensity to shift revenues separately from their propensity to shift expenses. Our results are consistent with the notion that while income-shifting occurs, the shift is not uniform across income and expense items.

It might appear straightforward for policymakers to predict short-run responses to large changes in the tax rates because it is generally preferable to defer taxable income to a time when tax rates are reduced. This can be accomplished by deferring transactions that trigger income recognition, accelerating transactions that trigger expense recognition, or casting current transactions in forms that delay income recognition (such as installment sales) or accelerate expense recognition. There are substantial impediments, however, to shifting taxable income across periods, and it becomes an empirical question as to whether the benefits of the shifting are sufficient to overcome the impediments. We document the extent to which corporate taxable income appears to have been shifted and discuss cross-sectional differences in firms' propensities to shift income.

Impediments to shifting taxable income across periods include offsetting tax consequences to other contracting parties and non tax costs. By the former, we mean that accelerating deductions or deferring income for one taxpayer often requires revenue acceleration or expense deferral to another taxpayer.[3] For example, a buyer of office supplies generally deducts the cost of the purchase

immediately, while the seller recognizes the sales price in taxable income immediately and deducts selling costs. If the buyer's and seller's tax rates are the same, the net tax savings from delaying a shipment of office supplies (to shift income from the sale to a later period when tax rates are lower) will generally be negative, because the buyer shifts his entire deduction to a lower tax-rate period, whereas the seller shifts taxable income for only a portion of the sales price (gross margin less selling costs).[4]

On the other hand, where sellers' tax rates are declining and buyers' tax rates are not, both parties may gain by shifting the transaction to the future and adjusting the purchase price so the buyer is compensated for the tax loss.[5] Because of the tax rate phase-in schedule of the 1986 Tax Act, brief windows of opportunity opened when some firms' tax rates were declining while others' remained constant. This phase-in feature provides an unusually rich opportunity to assess whether managers shift sales to future periods when tax rates are declining. During these brief deferral periods, sellers could reduce their taxes by as much as 12 percent of the deferred income without any loss to buyers whose tax rates were constant during the deferral period (ignoring the time-value of money). Of course, such tax-saving opportunities will not be exploited if, for example, the costs to sellers of identifying buyers outweigh the tax benefits. More generally, income shifting is attractive only if the net of tax and non-tax benefits to both parties is positive, i.e., as long as the net decrease in payments to the IRS exceeds the related transaction costs.

In addition to the explicit tax costs, myriad non tax costs may impede the income shifting. For example, firms can often reduce taxable income only by

reducing financial reporting income as well. Evidence in Scholes, Wilson, and Wolfson [1990] and elsewhere suggests that managers are reluctant to bear the perceived costs of reporting reduced income. In addition, postponing revenue recognition or accelerating expense recognition often can be accomplished only by changing the timing of underlying economic activities, which can involve significant non tax costs. For example, accelerating deductible expenditures may reduce operating efficiency, or customer relations may deteriorate from intentional delays in shipping finished goods, not to mention additional inventory holding costs. Further, the planning and co-ordination required to distort the normal pattern of transactions to shift taxable income across periods exacts administrative and implementation costs. Moreover, managerial compensation may be affected adversely by the shifting of income across periods. Finally, aggressive shifting of taxable income across periods invites closer IRS scrutiny.

We expect the non-tax costs of shifting income to differ across income and expense items and across firms. For some income items, the financial reporting costs from shifting income are minimal. For example, we expect that firms accelerated pension contributions because pension funds are tax exempt and because pension expenses for financial reporting purposes often differ from deductions for tax purposes. Similarly, we expect increased usage of installment sales because the buyers in such transactions do not suffer a tax cost associated with delaying tax deductions, while sellers not only postpone taxable income, they also recognize the income without delay for financial reporting purposes.

Those likely to be interested in learning the degree to which short-term income shifting follows the passage of tax legislation include organization theorists,

members of Congress and other public policymakers, financial analysts, and auditors. Organization theorists are interested in calibrating the degree to which transaction costs impede transactions that would otherwise increase firm value. Policymakers must be concerned about unintended consequences of both legislative changes and the manner in which the changes are phased in, in terms of both equity and efficiency. For example, they must evaluate whether it is equitable for firms that face low transaction costs to be allowed to shift income to receive windfall tax savings at the expense of other entities.

Financial analysts should also be interested in short-term income shifting behavior, because of its effects on financial accounting income. Capital market participants in turn are quite concerned about the time-series properties of reported income numbers and their relation to stock prices; short-term income shifting behavior may distort this historical relation.

IRS and external auditors should also be interested in evidence on the degree of income shifting across periods. Because the discriminant function used by the IRS to trigger audits is based on historical relations between revenues and expenses, short-term shifting of these items in the face of tax rate changes is likely to render this audit tool less effective. Similarly, external audit procedures that compare current-period revenue and expense patterns to historical patterns may yield "false positive" indications of financial statement errors or misrepresentations. On the other hand, changes in tax rates increase the incentives to record transactions in one period rather than another. If such behavior is empirically important, this warrants closer scrutiny of the exact timing of year-end transactions by both

external auditors and IRS auditors. Moreover, auditors should perhaps examine more carefully than usual the actual timing of physical delivery of goods.

1.1 Experimental Design and Tests

We test for income shifting for firms with fiscal years ending in March, June, September, and December during seven consecutive calendar quarters starting with the quarter ending September 30, 1986, as shown in Table 1.[6] The rows in Table 1 report the statutory rates and anticipated changes for the March, June, September, and December firms during these quarters. For example, for the calendar quarter ending 9/30/86, all firms faced a top tax rate of 46%, and the September firms anticipated a 3% decrease during the next quarter. If firms shift income when tax rates are declining, taxable income for this quarter should (everything else equal) be less for the September firms, who are ending their fiscal year on 9/30/86, than for firms ending their first, second, or third fiscal quarter on this date; i.e., the March, December, and June firms whose tax rates will remain the same over the two quarters.

Section 2.1 develops a model of gross margin deferral and acceleration of selling, general, and administrative (SG&A) expense, both by one quarter. We model these income components separately because, as indicated earlier, the timing of income shifting may differ for gross margin and SG&A . Also , these components include most material income items taxed at ordinary rates, but exclude capital gains. Because the tax rate on capital gains was increased by the 1986 Tax Act, firms may have wished to accelerate these gains. If capital gains data (for

income tax purposes) were available, we could have improved our model by estimating the amount of capital gains shifted.

In our design, the control and experimental groups exchange places across event dates, controlling for cross-sectional differences in the pattern of income. In addition, our tests take account of differing magnitudes of the tax incentive (ranging from 3% to 12%) across the seven event quarters.

Section 2.2 describes the experimental design and sample, Section 2.3 presents the main results for the model developed in Section 2.1, and Sections 2.4 and 2.5 explore the robustness of the results to alternative specifications and experimental controls, respectively. We find statistically significant evidence that firms shifted gross margin one quarter, but not necessarily SG&A. Taken in isolation, these results suggest an alternative to the income shifting hypothesis: income was lower because of an economic downturn that caused both gross margins and SG&A to decrease. On the other hand, firms may have shifted gross margin the quarter before their tax rates decreased and shifted expenses earlier in the year, or SG&A expenses may have decreased because of a delay in revenue-producing activities that trigger SG&A expenses. Because the economic downturn and income shifting hypotheses are not mutually exclusive, we use two controls for the effects of a possible downturn on our test parameters. First, all of the variables in our model are adjusted for changes in the gross national product.[7] Second, the exchanging of control and experimental firms across quarters controls for economy-wide factors not captured by the GNP index. When we compare our estimates of the tax shifted for firms that do and do not have an incentive to shift income in a

specific calendar quarter, we find significant evidence of overall income shifting and gross margin shifting, but not of SG&A shifting alone.

Section 3 provides evidence of income shifting over a longer event period that extends from the time at which firms first anticipated a tax-rate decrease until the end of the phase-in period. The research design accounts for the possibility (discussed earlier) that firms shifted income beginning more than one quarter preceding statutory reductions in tax rates and extending beyond one quarter following these tax rate reductions. In contrast to the short-window model in Section 2, this long-window model can not be used to estimate the tax savings associated with income shifting, it is only suitable for testing whether income shifting occurs. Another trade off is that the statistical assumptions underlying the test for income shifting are more suspect in Section 3. Using this long-window model, we find that the ratio of quarterly SG&A to sales was significantly larger than usual throughout the years when firms were anticipating a future tax-rate decrease. Section 4 summarizes the findings and discusses possible extensions.

2. Shifting Income the Quarter Before a Tax Rate Decrease

2.1 A Model of Income Shifting

In this section, we assume managers shifted gross margin and/or selling, general and administrative expenses from the quarters immediately preceding to the quarters immediately following scheduled tax-rate decreases to avoid a total of T dollars of taxes:

$$T = \tau_{e_1}(\lambda^{G}_{e_1} - \lambda^{X}_{e_1}) + \tau_{e_2}(\lambda^{G}_{e_2} - \lambda^{X}_{e_2}), \qquad (2.1)$$

where:

e_1 and e_2 are the firm's two event quarters (four quarters apart, $e_2 = e_1 + 4$ quarters);

τ_{e_j} is the decrease in the tax rate immediately following the jth event quarter, j = 1,2;

$\lambda^{G}_{e_j}$ is the gross margin shifted from event quarter e_j to the following quarter, $e_j + 1$ quarter;

$\lambda^{X}_{e_j}$ is the SG&A shifted from event quarter e_j to the following quarter, $e_j + 1$ quarter.[8]

In (2.1), the λ's represent shifted income: $\lambda^{G}_{e_1}$ is the amount of gross margin shifted at the end of the first quarter when tax rates declined, $\lambda^{G}_{e_2}$ is the amount of gross margin shifted at the end of the second quarter when tax rates declined (one year later), and $\lambda^{X}_{e_1}$ and $\lambda^{X}_{e_2}$ are the amounts of SG&A shifted during these quarters. The total tax shifted during the phase-in period is a weighted average of these shift parameters, where the weights depend on the magnitude of the tax rate decreases at each period. For example, for the September firms, e_1 and e_2 are the third calendar quarters in 1986 and 1987, respectively, and the total

income shifted forward at e_1 is $\lambda^G_{e_1} - \lambda^X_{e_1}$. Because tax rates dropped by 3% and 9%, respectively, in these quarters, September firms could save a total of $T = 0.03(\lambda^G_{e_1} - \lambda^X_{e_1}) + 0.09(\lambda^G_{e_2} - \lambda^X_{e_2})$ by shifting this income. In contrast, the λ's should be zero for non-September firms during these calendar quarters because their tax rates remain constant over these contiguous quarters.

We report T-estimates that are derived from (2.1) by substituting the known tax rate changes (the τ's) and estimates of the income shifted (the λ's). The model we estimate to derive the λ's reflects three assumptions:

1. Unmanaged gross margin, G^*_t, and unmanaged SG&A, X^*_t, both behave according to the model in Foster [1977]:[9]

$$G^*_t - G^*_{t-4} = \alpha^G_0 + \alpha^G_1 (G^*_{t-1} - G^*_{t-5}) + \varepsilon^G_t.$$
$$X^*_t - X^*_{t-4} = \alpha^X_0 + \alpha^X_1 (X^*_{t-1} - X^*_{t-5}) + \varepsilon^X_t. \qquad (2.2)$$

2. For all non-event quarters, reported and unmanaged income items are the same.

3. Income items are shifted forward by only one quarter. Thus, if reported gross margin is $\lambda^G_{e_j}$ less than unmanaged gross margin in quarter e_j,

reported gross margin will be $\lambda^{G}_{e_j}$ more than unmanaged gross income in quarter e_j+1.

Although we estimate equations for gross margin and SG&A jointly, for expositional convenience we will derive the gross margin model only. The second and third assumptions above imply that:

$$G_{e_1} = G^{*}_{e_1} - \lambda^{G}_{e_1},$$

$$G_{e_1+1} = G^{*}_{e_1+1} + \lambda^{G}_{e_1},$$

$$G_{e_2} = G^{*}_{e_2} - \lambda^{G}_{e_2},$$

$$G_{e_2+1} = G^{*}_{e_2+1} + \lambda^{G}_{e_2},$$

$$G_t = G^{*}_t \text{ for all other t.} \qquad (2.3)$$

The model simultaneously accounts for the original gross margin shifted in quarter e_j and the reversal in quarter e_{j+1}. Substituting (2.3) into (2.2) yields the equation used to measure the shifted gross margin:

$$G_t - G_{t-4} = \gamma_t + \alpha^{G}_1 (G_{t-1} - G_{t-5}) + \varepsilon^{G}_t. \qquad (2.4)$$

In the unmanaged (2.2) and reported (2.4) time-series models, the slopes are the same but the intercept for the reported model, γ_t, is time dependent. Nevertheless, as demonstrated in Appendix A, for all t, γ_t is a linear function of five parameter expressions: α_0, $\lambda^{G}_{e_1}$, $\lambda^{G}_{e_2}$, $\alpha_1\lambda^{G}_{e_1}$, and $\alpha_1\lambda^{G}_{e_2}$. Thus, even though

(2.4) is nonlinear, the λ's are estimated using a linear regression model (discussed in the appendix). Also, because T (the tax savings from shifting) is a linear function of the λ's, an estimate of T and the related standard errors are readily derived.

Because the intercepts (the γ_t's) depend on the λ's, nine observations are used to estimate the income shifting that occurs during two event quarters. In contrast, we would have used only four observations in a traditional "event-study" approach that compared the reported figures for the two event and two reversal quarters to those predicted by a Foster model estimated with non-event observations. This gain in observations is a benefit of incorporating a specific structure of income shifting behavior (from the fourth quarter of one year to the first of the next) into the Foster model. The cost of imposing this structure, however, is that our model might be misspecified, either because the Foster model is inappropriate, or because income was not shifted in the manner we hypothesize. Later, we specify alternative patterns of possible income shifting behavior.

In addition, the time-dependent intercept for the second event quarter (γ_{e_2}) is the intercept for the unmanaged model (α_0) plus the income shifted four quarters earlier during the first event quarter ($\lambda^G_{e_1}$) less the income shifted during the second event quarter ($\lambda^G_{e_2}$). If firms shifted the same amount of income both event quarters, the intercept for the second event quarter would be the same as the intercept for the unmanaged model (because the λ's would cancel each other). Stated alternatively, no shifting would be detected for the second event quarter

using the traditional event-study approach described above. Moreover, if more income was shifted during the first event quarter than the second, this alternative approach would incorrectly indicate that income was accelerated, not deferred, during the second quarter. Because equation (2.4) models the interaction across event quarters explicitly, it structures the second event-quarter intercept so as to measure the separate effects of shifting income during both quarters.

2.2 Experimental Design and Sample

For each firm, four estimates of the taxes saved from income shifting are derived using (2.1), one experimental estimate and three control estimates. The experimental estimate is based on a model that assumes income is shifted forward one quarter during each firm's fourth fiscal quarter, while the control estimates are based on models that assume income is shifted forward one quarter during each firm's other three fiscal quarters. The motivation for the control estimates is to capture phantom tax savings that reflect changes in macroeconomic conditions rather than explicit tax planning actions taken. For the September firms, control estimates are derived by treating the September firms as if they are December, March, and June firms during the December, March, and June event quarters, respectively. For example, the control estimation weights the income shifted by the September firms during their first fiscal quarters (that end in December 1986 and 1987) by the tax rate changes the December firms experienced during these quarters (six percent each year). Similarly, March and June firms are used to generate control estimates for these December event quarters. The overall control estimate

for the December firms is the average of the control estimates calculated during the fourth calendar quarter for the September, March, and June firms.

To estimate the total tax savings for the entire sample, we sum the tax savings estimates for all firms during quarters preceding tax rate changes. For tests that control for an economic downturn, we subtract the phantom tax "savings" for the control firms from that for the experimental firms.

As reported in Table 2, 812 firms met all data requirements for purposes of model estimation. These firms are broadly dispersed across 57 two-digit SIC industries with 22 industries having 10 or more firms represented. Approximately 70% of the sample are December firms, 6% March, 14% June, and 10% September firms. Industry clustering by fiscal-year end is evident for 7 of the 22 industries having 10 or more firms. But an equal number of these 22 industries exhibit considerable dispersion of fiscal year ends, relative to the sample as a whole. Panels 5 and 6 of Table 3 provide additional descriptive statistics on sales and sales growth for these 812 firms.

2.3 Results

Panel 1 of Table 3 reports summary statistics for the tax savings estimated using equation (2.1). For the 812 firms in the sample, the mean amount of estimated taxes saved from shifting gross margin and SG&A expenses during the quarters immediately preceding tax rate decreases in 1986-88 was $459 thousand. To place this in perspective, note that the average decline in tax rates during event periods is 12% over the two event quarters for March, September, and December firms, and 12% over one event quarter for June firms. June firms comprise 14% of

the total sample. Therefore, each dollar of taxable income postponed for one quarter during an event period resulted in a permanent tax savings of roughly 6¢.

If the tax savings is attributable to delayed sales, and the average gross margin is one-third of sales, then tax savings of $1 corresponds to a shifting of $50 of sales; i.e., $1= 0.06*$50*1/3. And the $459 thousand of tax savings reported in Table 3 corresponds to $22.95 million of shifted sales per firm, or $18.6 billion total for the 812 firms in the sample. This is 1.6% of average sales for our sample firms, as reported in Panel 5 of Table 3, an amount that is nearly equal to the average quarterly sales growth of 1.9% as shown in Panel 6 of Table 1.

As indicated in Panel 1 of Table 3, the tax savings estimate for one firm, IBM, is $133 million, with a standard error of $33 million. While this observation has a large positive influence on the average and is more likely than not to include a positive estimation error, there are also numerous firms for which we estimate negative tax savings from income shifting. Also, because the firm-specific tax estimates are standardized by their standard errors before cross-sectional aggregation to determine the overall statistical significance of income shifting, the resulting statistic is not materially affected by IBM. Indeed, the t-statistic reported in Panel 3 of Table 3 and discussed shortly, scarcely drops from 3.74 to 3.60 when IBM is excluded.[10]

Although not reported, the mean and median tax avoided as a fraction of pretax income, where pretax income is positive, are 0.87% and 0.23%, respectively.[11] If average tax rates are 40%, these represent tax reductions of approximately 2.2% and 0.6%, respectively, of the tax bill.

Beyond economic significance, Panel 2 of Table 3 indicates that the estimated tax avoided is also statistically significant (t=3.74). The evidence of income shifting is apparent only for the upper three sales-size quintiles (t=1.82, 2.78, and 3.57, respectively). These size-related results are consistent with smaller public firms being less opportunistic tax planners than other public firms, perhaps because they have less sophisticated tax departments.[12] Alternatively, the smaller public firms may be less opportunistic tax planners because they are more sensitive to financial reporting costs. If differences in financial reporting costs, rather than differences in sophistication of tax departments, explain these size-related results, we would not expect similar results for closely-held firms (that tend to be smaller). Tax professionals at the major accounting firms inform us that, because closely-held firms are not accountable to stock market participants, they are more opportunistic tax planners than publicly held companies. While these size-related results are consistent with a modified income shifting hypothesis, they seem to argue against the economic downturn hypothesis that we will examine more closely in the next subsection. Generally, smaller firms are at least as susceptible to an economic downturn as larger firms.[13] Finally, the size related results could be due to differences in goodness of fit for the Foster model. The r-squares for both the gross margin and SG&A versions of (2.4) increase with firm size.[14]

Panels 3 and 4 of Table 3 reveal that shifting gross margin, rather than shifting SG&A expenses, accounts for the tax savings estimated using equation (2.4). As discussed earlier, one casualty of shifting sales is that SG&A expenses tied to those sales are also shifted.

2.4 Specification Checks for the Tax Savings Estimation

The results presented thus far are based on a sample that includes firms that report net operating loss carryforwards in 1986 or 1987, although these NOL firms did not have the same tax incentive to defer income. When these firms are excluded, the average tax savings associated with income shifting increases from \$459 to \$523 thousand, and the related statistical significance also increases (the t-statistic increases from 3.74 to 4.40), even though the sample size decreases from 812 to 571 firms.[15]

As another specification check, recall that we have assumed income was shifted from the fourth fiscal quarter of one year to the first fiscal quarter of the following year. In particular, we specified that managed and unmanaged income were equal for the other quarters (recall from (2.3) that $G_t = G_t^*$ for such quarters). But if income deferral begins earlier in the period preceding scheduled changes in tax rates, say in the third fiscal quarter rather than in the fourth fiscal quarter, then the growth term in the Foster model, $(G_{t-1}^* - G_{t-5}^*)$, will be misspecified for the fourth quarter and the tax savings estimate will be biased downward. One control for this possibility is to add a parameter to measure income shifted from earlier quarters, although this introduces considerable complexity. As an alternative, we replaced the "contaminated" growth term, $(G_{t-1}^* - G_{t-5}^*)$, with one that is likely to be noisier (absent income shifting) but is not contaminated by income shifting, $(G_{t-5}^* - G_{t-9}^*)$.[16] With this control, the estimate of the average tax savings increases from

$459 thousand to $564 thousand, but the standard error also increases. Overall, the statistical significance of the tax savings barely changes (t=3.57 versus t=3.74).

2.5 Shifting Income Versus Economic Downturn

In this section, we control for the effects of a possible economic downturn by comparing estimated tax savings for firms that do and do not have an incentive to shift income in specific calendar quarters. The 812 experimental estimates are based on a model that assumes income is shifted during the fourth fiscal quarter, while the 2,436 (that is, 812*3) control estimates calculate phantom tax savings during each firm's other three fiscal quarters. In contrast to the $459 thousand of average tax savings reported earlier for the experimental group, the average control group tax savings is negative $3 thousand. A standard means-difference test (adjusted for the number of observations and parameter estimates as in Patell [1976]) yields a t-statistic of 3.08. Repeating this procedure for the income components, we find a significant difference between the experimental and control estimates for gross margin shifting (t=3.31) but not for SG&A shifting (t =-0.51).

Among the models assumptions, is that income shifting occurs only during event quarters. Since experimental firms serve as control firms during periods other than quarters surrounding their tax rate changes, we expect this assumption to be violated for control firms. For the purpose of estimating model parameters, however, we assume the violation of this assumption has a second order effect. We control partially for this complication by repeating the test after eliminating control firms whose fiscal years end the quarter after the experimental group's fiscal

years. For example, we eliminated the December firms when the September firms were the experimental group. The related t-statistic was slightly smaller (t=2.78), possibly because the sample size was reduced.

These results could also obtain because Foster's model treats all quarters identically when in fact each quarter may display distinct statistical properties. As a specification test, we replicated the test for a difference in income shifting between the experimental and control groups using seven "event" quarters beginning September, 1984. This is the first September when data are available and the only one where the parameter estimates will not be affected by data in the actual event periods (that start in September, 1986). The t-statistic for income shifting for this "pseudo-experiment" (corresponding to 3.08 for the actual event period) is -0.28, suggesting that our results are not simply induced by systematic differences in statistical properties of different quarters' income numbers.

3. Shifting Income Between the Announcement of a Tax Decrease and the Completion of the Tax-Rate Decrease Phase-In

This section examines income shifting over a broader event window than the previous section. As indicated earlier, we suspect that taxable income may have been shifted earlier than the quarter immediately preceding a decrease in tax rates. The time-series models used earlier are inappropriate for these longer window tests. First, we are uncertain when the income shifting occurred or when it reversed. Second, because the event periods extend for several quarters and because the estimation period straddles the event period, there are not enough observations to

estimate the Foster model. As an alternative, we model the ratio of SG&A to sales as a seasonal constant plus white noise:

$$SGA_t/Sales_t = \alpha_0 + \alpha_1 I_m + \alpha_2 I_j + \alpha_3 I_d + \alpha_4 \text{ trend} + \varepsilon_t \quad (3.1)$$

where

I_m equals 1 for March calendar quarters and 0 otherwise;

I_j equals 1 for June calendar quarters and 0 otherwise;

I_d equals 1 for December calendar quarters and 0 otherwise; and

trend is a quarterly time-trend variable that takes on values that range from 1 to 32.

We predict that SG&A (the numerator of the dependent variable) will increase and that sales (the denominator) will decrease in anticipation of a tax rate decrease. Thus, tests discussed in this section consider jointly whether income is shifted over these longer intervals by reducing sales, by increasing SG&A, or both. Dummies and a time trend are included to control for different accounting treatment across fiscal quarters and, more generally, for seasonality and secular trends.

There are two types of event intervals: the quarters when firms had an incentive to defer income (the primary event period) and the two quarters immediately thereafter, when a reversal may have occurred (the secondary event period).[17] As indicated in Table 4, the primary event intervals for all four types of firms start with the September 1986 quarter and end in different quarters. For example, the March firms' event interval covers seven quarters, ending in March 1988, immediately before tax rates decreased to 34%.

The model was estimated once (for each firm) using data from both the pre-event and post-event estimation quarters indicated in Table 4. The null hypothesis is that, on average, the model's errors, ξ, are zero during the event periods. The alternative hypothesis is that, on average, these errors are positive during the primary event period (when income is being shifted forward) and negative during the secondary event period (the period to which income is shifted). The estimation procedure and related test statistics are described in Appendix B.

Table 5 reports the mean quarterly standardized prediction errors for each of the four fiscal-year-end groups.[18] The positive prediction errors during the primary event period are consistent with firms either accelerating SG&A or deferring sales or both. The results in Table 5 also suggest that income shifted during the primary event period reverses during the secondary event period, if not shortly before. The negative mean prediction errors in quarters near the end of the primary event period do <u>not</u> imply an absence of income shifting: as indicated in Appendix A, the amount of "net" shifting in the second year can be negative if reversals from the first year are large.

The relatively large positive residuals immediately preceding the primary event period are consistent with firms anticipating the tax-rate decrease before the Senate passed the Tax Act on September 27, 1986. The April 18, 1986 edition of the <u>Kiplinger Tax Letter</u> reported that the Senate Finance Committee was planning to reduce the top corporate rate to 35% and the May 16, 1986 version of this newsletter reported that the Senate Finance Committee had revised this estimate to 33%. An alternative explanation for these pre-event results is that they reflect an

economic downturn that started before, and extended into, the primary event period. Later, we control for the possibility that our results are being driven by such a downturn.

The apparent serial correlation in the residuals could be addressed by including lagged terms, if sufficient data were available. Recall that there are not enough data to estimate a Foster-type model outside the event periods; moreover, without knowing when the shifting begins and reverses, we cannot use the event-period data. The more structured approach used in Section 2, which specified when the shifting began and reversed, permitted us to use all observations for estimation and to control for serial correlation. Thus, in this section the event windows are long enough to detect income shifting over longer periods but the test statistics are somewhat suspect because of the apparent serial correlation in the residuals.

Table 6 reports results for the two event periods by fiscal-year-end group.[19] As indicated earlier, the weighting scheme assumes that all reversals occur after the primary event period when the maximum corporate tax rate became 34 percent, but the results are not sensitive to this assumption. Summary statistics are provided for the firm-specific estimates by fiscal-year-end group. For example, over the primary event period (Panel 1 of Table 6), 57 percent of the 655 December firms' standardized average prediction errors were positive, as expected. The t-statistics in Panel 1 indicate that the null hypothesis of no income shifting is rejected in favor of income shifting for all four fiscal-year-end groups (t=3.08, 2.93, 3.76, 11.94). In contrast, the results in Panel 2 of Table 6 indicate that during the secondary event period only 33% to 45% of the standardized prediction errors are positive for the

four fiscal-year portfolios, and the means for all four portfolios are negative, also as predicted; none of the t-statistics indicate statistical significance at conventional levels, but all are of the predicted sign.

These results are consistent with both the income shifting hypothesis and the presence of an economic downturn. To control for this possibility, we compare the predicted residuals for three calendar quarters (those ending September 30, 1987 through March 31, 1988) when some firms had already received the full tax-rate decrease and others still anticipated a decrease.[20] The prediction errors are larger for the firms that were still anticipating a tax rate decrease ($t=1.58$, $p=0.06$), despite the fact that the remaining anticipated tax rate decrease was relatively small by this time.

4.0 Summary and Conclusions

The reduction in statutory tax rates from 46% prior to the 1986 Tax Act to 34% by the middle of 1988 gave firms an incentive to defer income in 1986 and 1987. We provide evidence that firms deferred revenue recognition and/or accelerated expense recognition in anticipation of these declining tax rates and discuss cross-sectional differences in firms' propensities to shift income.

We use two models to assess whether firms shifted income to future periods when they anticipated lower tax rates. The first assumes that gross margin and selling, general, and administrative (SG&A) expenses were shifted from the quarter immediately before an anticipated decrease in tax rates to the next quarter. The model estimates the difference between reported accounting numbers and unmanipulated ones that would have been reported in the absence of income

shifting. We find statistically significant evidence that firms deferred gross margin until tax rates decreased, but we do not find evidence that firms accelerated SG&A deductions by one quarter. Our results suggest that, on average, our 812 sample firms saved approximately $500,000 in taxes by deferring sales for one quarter. There is evidence of income shifting for each of the three largest quintiles of sample firms, but not for the two smallest size quintiles, suggesting smaller firms are less opportunistic tax planners.

These results should be viewed as conservative estimates of the tax savings associated with tax planning motivated by the 1986 Tax Act for at least three reasons: (1) we did not consider tax savings related to the shifting of capital gains-producing transactions, (2) the $500,000 estimate reflects shifting of taxable income from the quarters immediately preceding the tax rate reductions to the quarters immediately following such reductions, thus, it fails to incorporate shifting of taxable income that began earlier or ended later, and (3) we did not consider certain components of ordinary taxable income such as interest.

Our second model examines income shifting over a longer event window that extends from the first quarter when firms are assumed to anticipate a tax-rate decrease to the end of the tax-rate phase-in period. This second approach is analogous to a capital markets event study where a model is estimated outside an event period, and then its prediction errors are accumulated over the event period. The ratio of SG&A to sales is modeled as a seasonally mean reverting process with an annual trend. As was true with our earlier tests, the prediction errors from this model are positive and significant during the event period, indicating either that

firms accelerated SG&A deductions, deferred sales, or both in anticipation of lower tax rates.

This paper can be extended by a multilateral approach that considers tax shifting behavior by industry as a function of the nature of customers and products. Consumers do not care about income shifting for tax reasons but corporate customers do and sales of durable products are more likely to be delayed because buyers forego the tax benefits associated with one period's depreciation only. Similarly, sales of seasonal products, such as Christmas trees, are less likely to be delayed for tax reasons. Future research could also examine tax planning related to transactions giving rise to capital gains. In contrast to ordinary income, the 1986 Tax Act increased the capital gains tax rate. Another extension would be to use deferred tax information to study items that affect financial and tax reporting differently. Finally, future research could study whether analysts detect income shifting by examining the correlation between measures of income shifting and analysts' forecast errors.

APPENDIX A

This appendix presents the time-dependent intercepts (the γ_t's) for equation (2.4) and describes estimation procedures. As indicated in the text, (2.4) is derived by substituting (2.3) into (2.2):

$$G_t - G_{t-4} = \gamma_t + \alpha_1 (G_{t-1} - G_{t-5}) + \varepsilon_t^G, \qquad (2.4)$$

where the time-dependent intercepts are

$\gamma_t = \alpha_0$ for $t < e_1$ and $t > e_2+6$ and

$$\gamma_{e_1} = \alpha_0 - \lambda^G_{e_1}$$

$$\gamma_{e_1+1} = \alpha_0 + \lambda^G_{e_1} + \alpha_1 \lambda^G_{e_1}$$

$$\gamma_{e_1+2} = \alpha_0 - \alpha_1 \lambda^G_{e_1}$$

$$\gamma_{e_1+3} = \alpha_0$$

$$\gamma_{e_2} = \alpha_0 + \lambda^G_{e_1} - \lambda^G_{e_2}$$

$$\gamma_{e_2+1} = \alpha_0 - \lambda^G_{e_1} - \alpha_1 \lambda^G_{e_1} + \lambda^G_{e_2} + \alpha_1 \lambda^G_{e_2}$$

$$\gamma_{e_2+2} = \alpha_0 + \alpha_1 \lambda^G_{e_1} - \alpha_1 \lambda^G_{e_2}$$

$$\gamma_{e_2+3} = \alpha_0$$

$$\gamma_{e_2+4} = \alpha_0 + \lambda^{G}_{e_2}$$

$$\gamma_{e_2+5} = \alpha_0 - \lambda^{G}_{e_2} - \alpha_1\lambda^{G}_{e_2}$$

$$\gamma_{e_2+6} = \alpha_0 + \alpha_1\lambda^{G}_{e_2}$$

The λ's in equation 2.4 are estimated using the following linear regression model:

$$Y^G = Z^G\Gamma^G + \varepsilon^G$$

$$Y^X = Z^X\Gamma^X + \varepsilon^X \qquad \text{(A-1)}$$

where:

$Y^G = G_t - G_{t-4}$, t = 6 to 32 (there are 32 quarters of data),

$Y^X = X_t - X_{t-4}$, t = 6 to 32,

Z^G and Z^X are (27 x 6) design matrices with the following columns:

1. Ones in each row;
2. $G_{t-1} - G_{t-5}$, t = 6 to 32 for Z^G and $X_{t-1} - X_{t-5}$, t = 6 to 32 for Z^X;
3. Zeros from row 1 until the row before the row corresponding to the first event quarter, followed by six rows containing -1,1,0,0,1,-1, followed by zeros in the remaining rows;
4. Zeros from row 1 through the row corresponding to the first event quarter, followed by six rows containing 1, -1,0,0,-1,1, followed by zeros in the remaining rows;
5. Similar to column 2 except for the second event: Zeros from row 1 until the row before the row corresponding to the second event quarter,

followed by six rows containing -1,1,0,0,1,-1, followed by zeros in the remaining rows;

6. Similar to column 3 except for the second event: Zeros from row 1 until the row corresponding to the second event quarter, followed by six rows containing 1,-1,0,0,
   -1,1, followed by zeros in the remaining rows.

Γ^G and Γ^X are 6x1 parameter vectors with the following transposes:

$$\{\alpha_0^G, \alpha_1^G, \lambda_{e_1}^G, \alpha_1^G\lambda_{e_1}^G, \lambda_{e_2}^G, \alpha_1^G\lambda_{e_2}^G\}$$

$$\{\alpha_0^X, \alpha_1^X, \lambda_{e_1}^X, \alpha_1^X\lambda_{e_1}^X, \lambda_{e_2}^X, \alpha_1^X\lambda_{e_2}^X\}, \text{ and}$$

ε^G and ε^X are 27x1 vectors of regression errors.

To control for contemporaneous correlation in the model's errors, we use three-stage least squares to estimate $\Gamma = \{\Gamma^G, \Gamma^X\}$(page 511 of Theil [1971])[21].

The total tax avoided,T, is then estimated as:

$$T_{est} = C\,\Gamma$$

where:

$$C=\{0,\ 0,\ \tau_{e_1},\ 0,\ \tau_{e_2},\ 0,\ 0,\ 0,\ -\tau_{e_1},\ 0,\ -\tau_{e_2},\ 0\}.$$

Because T_{est} is a linear multiple of the parameter estimates, its standard error can be derived readily from a formula in Theil (page 512). Providing the ε's in (A-1) are distributed as standard normals, T_{est} divided by the square root of this standard error has a t-distribution with M-K degrees of freedom, where M and K are the number of observations and parameters, respectively. Assuming these t-

statistics are independent across firms, an overall z-statistic can be derived using a variant of the procedure described in Patell [1976].[22] The separate tax avoided and the test statistics relating to the shifting of gross margin or SG&A are derived similarly.[23]

APPENDIX B

This appendix describes how the test statistics in Tables 2 and 3 are derived. Equation (3.1) is estimated separately for each firm. The resulting parameter estimates and event-period sales and SG&A are then used to calculate prediction errors, e_p, for the event-period quarters.

For each firm, a weighted average of these quarterly predictions, $[A'_{prm}e_p]$, is then derived for the primary event period. The weights, A_{prm}, reflect the fact that firms' tax incentive to shift income changed during the primary event interval. For example, prior to March 31, 1987, March firms anticipated tax-rate decreases of nine percent and three percent, respectively, during the next two years, or a combined decrease of twelve percent. If March firms accelerated future deductions by one year (two years) they received a nine percent (twelve percent) tax-rate benefit. One year later, on March 30, 1988, the March firms anticipated a three percent tax-rate decrease. Note that to specify these weights correctly, we would need to know when the shifted income items reverse. Because we are not sure of when the reversals occurred, we used three weighting schemes. For the March firms, the first weighting scheme (and the one we report results for) assumes that

all of the reversals occur after March 31, 1988 when the corporate rate was 34%. Thus, the weight proportions are (12,12,12,3,3,3,3) for the seven primary-event quarters (ending September 1986, December 1986, March 1987, etc.). The second scheme's weights are proportionate to (9,9,9,3,3,3,3); they assume that reversals occur the year after income is shifted. The third scheme uses equal weighting.[24] Equal weights are also used for the secondary event intervals. To derive the quarterly (rather than event period) results in Table 5, the weight corresponding to the quarter being considered is set to one and all other weights are set to zero.

Firms' standardized-average-primary-event-period prediction errors, SAR_{prm}, are then determined as follows (a similar procedure is used for the secondary event interval):

$$SAR_{prm} = [A'_{prm} e_p] / \sqrt{s^2 (A'_{prm} (I + X_p (X'_{est} X_{est})^{-1} X'_p) A_{prm})} \qquad \text{(B-1)}$$

where:

X_{est} is an n_{est} x 4 design matrix (based on equation (3.1)) for the combined estimation periods, where n_{est} is the total number of quarters used for estimation;

X_p is an n_p x 4 design matrix for the combined event periods, where $n_p = 32 - n_{est}$, is the total number of quarters in the two event intervals;

e_p is an n_p x 1 vector of prediction errors for the combined event quarters;

s^2 = $(e'_{est}e_{est})/(n_{est} - 4)$, where e is the n_{est} x 1 vector of residuals from the estimation quarters and e_{est} is an n_{est} x 1 vector of residuals for the combined estimation quarters;

A_{prm} is an n_p x 1 vector of weights.[25]

The firm-specific results determined using this procedure are then combined by fiscal-year-end (e.g., the standardized results are combined for the December firms) using a variant of the Patell [1976] approach discussed earlier .

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TABLE 1

Corporate Tax Rate Phase-Ins for the Tax Reform Act of 1986

	Quarters in Calendar Time							
Fiscal-Year End	9/30/86	12/31/86	3/31/87	6/30/87	9/30/87	12/31/87	3/31/88	6/30/88
March 31								
Statutory Rate	46	46	46	37	37	37	37	34
Anticipated Change	0	0	9[a]	0	0	0	3[a]	0
June 30								
Statutory Rate	46	46	46	46	34	34	34	34
Anticipated Change	0	0	0	12[a]	0	0	0	0
September 30								
Statutory Rate	46	43	43	43	43	34	34	34
Anticipated Change	3[a]	0	0	0	9[a]	0	0	0
December 31								
Statutory Rate	46	46	40	40	40	40	34	34
Anticipated Change	0	6[a]	0	0	0	6[a]	0	0

[a] The tax rate decreases for the seven event quarters..

TABLE 2

Sample Selection

Requirement	Remaining Firms
Compustat Plus Firms with March, June, September, or December Fiscal-Year-End	5261
Publicly traded company or a subsidiary of a publicly traded company (Compustat-Plus Item STKO = 0 or 1)	5044
Quarterly Sales from the third calendar quarter of 1982 through the second calendar quarter of 1990	2248
End-of-Quarter Assets from the third calendar quarter of 1982 through the second calendar quarter of 1990	1998
Quarterly selling, general, and administrative expenses (SG&A) from the third calendar quarter of 1982 through the second calendar of quarter of 1990	991
Pass all of the following screens for all quarters between 82Q3 and 90Q2 Sales exceeds 0.001 SG&A exceeds 0.001 Increase in end-of-quarter assets does not exceed 300% Decrease in end-of-quarter assets does not exceed 75% Sales divided by end-of-quarter assets exceeds 0.001 SG&A divided by sales exceeds 0.001 SG&A divided by sales is less than 300%	938[a]
Quarterly Gross Margins (Sales less cost of goods sold) from the second calendar quarter of 1982 through the second calendar of quarter of 1990	812[b]

[a] Tests on this sample are reported in Tables 2 and 3.

[b] This sample contains 51 March firms, 114 June firms, 72 September firms, and 575 December firms. Tests on this sample are reported in Table 1.

TABLE 3

Shifting Immediately Prior to a Tax Decline

1. Total Tax Avoided, T_{est}, by Shifting Both Gross Margin and SG&A (in Millions of $)

	Quintiles Based on 1989 Annual Sales					
	1	2	3	4	5	All Firms
Minimum	-0.779	-0.505	-8.897	-1.271	-6.803	-8.897
First Decile	-0.052	-0.126	-0.306	-0.495	-2.795	-0.405
Median	-0.002	0.006	-0.005	0.042	0.209	0.006
Ninth Decile	0.049	0.081	0.233	0.483	3.943	0.733
Maximum	1.027	0.811	1.940	3.179	133.271	133.271
Mean	0.007	-0.002	-0.057	0.097	2.243	0.459
Observations	162	163	162	162	163	812

2. T-stats for Tax Avoided, T_{est}, by Shifting Both Gross Margin and SG&A

	Quintiles Based on 1989 Annual Sales					
	1	2	3	4	5	All Firms
Minimum	-4.11	-3.88	-4.17	-3.71	-3.49	-4.17
First Decile	-1.56	-1.83	-1.78	-1.50	-1.49	-1.62
Median	-0.18	0.09	-0.07	0.21	0.30	0.07
Ninth Decile	1.52	1.56	1.85	1.76	1.71	1.80
Maximum	8.07	3.25	9.74	3.13	8.52	9.73
Mean	0.01	0.01	0.14	0.23	0.28	0.13
Overall t-value	0.10	0.09	1.82	2.78	3.57	3.74
Observations	162	163	162	162	163	812

TABLE 3 (Continued)

3. T-statistics for Tax Avoided by Shifting Gross Margin Only

	Quintiles Based on 1989 Annual Sales					
	1	2	3	4	5	All Firms
Minimum	-4.33	-4.71	-4.56	-5.83	-5.37	-5.83
First Decile	-1.89	-1.86	-2.15	1.75	-1.95	-1.85
Median	-0.01	0.08	-0.06	0.12	0.24	0.09
Ninth Decile	1.60	1.93	2.18	2.14	1.93	2.01
Maximum	4.71	5.52	9.62	3.95	8.63	9.62
Mean	0.00	0.12	0.16	0.19	0.22	0.14
Overall t-value	0.01	1.49	2.01	2.45	2.80	3.92
Observations	162	163	162	162	163	812

4. T-statistics for Tax Avoided by Shifting SG&A Only

	Quintiles Based on 1989 Annual Sales					
	1	2	3	4	5	All Firms
Minimum	-4.19	-5.73	-4.35	-12.40	-4.25	-12.41
First Decile	-2.13	-2.47	-2.51	-2.14	-2.08	-2.21
Median	-0.27	-0.18	-0.23	0.11	0.08	-0.03
Ninth Decile	2.45	1.76	2.22	1.67	1.94	2.12
Maximum	7.96	6.46	13.39	8.78	5.30	13.39
Mean	-0.01	-0.16	-0.07	0.04	0.07	-0.03
Overall t-value	-0.13	-2.07	-0.90	0.56	0.91	-0.74
Observations	162	163	162	162	163	812

TABLE 3 (Continued)

5. Annual Sales for 1989 (in Millions of $)

	Quintiles Based on 1989 Annual Sales					
	1	2	3	4	5	All Firms
Minimum	0.06	24.18	88.53	306.65	1266.14	0.06
First Decile	2.21	28.41	100.57	337.55	1444.09	9.43
Median	9.43	51.22	158.53	578.60	3161.20	158.53
Ninth Decile	21.20	75.67	272.13	1076.70	11942.00	3161.20
Maximum	24.18	87.57	306.42	1243.18	86656.00	86656.00
Mean	10.89	51.83	170.55	634.70	6260.24	1428.93
Observations	162	163	162	162	163	812

6. Quarterly Percentage Sales Growth Between 1982,Q3 and 1990,Q2

	Quintiles Based on 1989 Annual Sales					
	1	2	3	4	5	All Firms
Minimum	-13.78	-5.93	-5.55	-3.95	-1.97	-13.78
First Decile	-4.03	1.80	1.06	0.16	0.21	1.30
Median	0.73	1.61	2.27	2.39	2.11	2.00
Ninth Decile	4.20	4.93	5.55	5.74	4.40	5.09
Maximum	9.01	10.54	14.01	8.56	14.37	18.56
Mean	0.48	1.65	2.45	2.77	2.37	1.94
Observations	162	163	162	162	163	812

This table's results are based on the estimation procedure discussed in Section 2.2.

TABLE 4

Estimation and Event Intervals
For the Model in Section 3

	Fiscal-Year End			
	March	June	Sept	Dec
Pre-Event Estimation				
Start	1982,Q3	1982,Q3	1982,Q3	1982,Q3
End	1986,Q2	1986,Q2	1986,Q2	1986,Q2
Primary Event Period				
Start	1986,Q3	1986,Q3	1986,Q3	1986,Q3
End	1988,Q1	1987,Q2	1987,Q3	1987,Q4
Secondary Event Period				
Start	1988,Q2	1987,Q3	1987,Q4	1988,Q1
End	1988,Q3	1987,Q4	1988,Q1	1988,Q2
Remaining Post-Event Estimation				
Start	1988,Q4	1988,Q1	1988,Q2	1988,Q3
End	1990,Q2	1990,Q2	1990,Q2	1990,Q2

The estimation and event periods differ by fiscal-year end. For example, for the September firms, Equation (3.1) is estimated using observations from two periods, the third quarter of 1982 through the the second quarter of 1986, and the second quarter of 1988 through the second quarter of 1990. The primary event period starts with the third quarter of 1986, the first quarter that all firms are assumed to have known about the tax rate decrease. It ends the quarter before rates were decreased to 34%. For the September firms, this is the third calendar quarter of 1987. The secondary event periods are the first two quarters after the end of the primary event period, when reversals in income shifting are assumed to have occurred.

TABLE 5

Analysis of the Ratio of Selling, General and Administrative Expenses to Sales: Standardized Quarterly Prediction Errors and Residuals (Means at Quarterly Calendar Intervals for Each Portfolio of Firms with Identical Fiscal Year-Ends)

Year and Quarter	Fiscal-Year-End of Sample				
	March	June	September	December	All Firms
82 9	0.292	0.437	0.264	0.161	0.218
82 12	0.105	0.534	0.068	0.348	0.332
83 3	0.011	0.229	-0.012	0.125	0.120
83 6	0.099	0.138	-0.083	0.051	0.053
83 9	-0.019	-0.116	-0.166	-0.072	-0.084
83 12	-0.027	-0.188	-0.140	-0.229	-0.202
84 3	-0.208	-0.422	-0.075	-0.274	-0.271
84 6	-0.041	-0.439	-0.247	-0.309	-0.304
84 9	-0.217	-0.328	-0.210	-0.179	-0.205
84 12	-0.137	-0.284	-0.099	-0.216	-0.209
85 3	0.164	-0.113	0.065	0.050	0.035
85 6	-0.122	-0.161	0.202	-0.067	-0.058
85 9	-0.074	0.037	0.196	0.113	0.098
85 12	-0.084	0.082	0.134	0.113	0.098
86 3	0.163	0.186	0.221	0.196	0.195
86 6	0.027	0.256	0.153	0.334	0.286
86 9	0.176[a]	0.192[a]	0.308[a]	0.383[a]	0.335
86 12	0.287[a]	0.221[a]	0.397[a]	0.298[a]	0.296
87 3	0.230[a]	0.103[a]	0.253[a]	0.180[a]	0.179
87 6	-0.039[a]	-0.008[a]	0.007[a]	0.091[a]	0.061
87 9	0.074[a]	-0.051[b]	-0.076[a]	0.075[a]	0.042
87 12	0.174[a]	0.014[b]	0.003[b]	0.006[a]	0.018
88 3	0.034[a]	0.061[b]	-0.076[b]	-0.031[b]	-0.018
88 6	-0.128	0.159	-0.060	0.009	0.015
88 9	0.001	-0.018	-0.130	-0.047	-0.048
88 12	0.009	-0.202	-0.043	-0.054	-0.070
89 3	-0.179	-0.064	-0.135	-0.140	-0.131
89 6	-0.088	-0.125	-0.079	-0.148	-0.134
89 9	0.028	0.001	0.051	0.028	0.026
89 12	0.146	0.072	0.083	0.047	0.061
90 3	0.044	0.128	-0.073	0.041	0.042
90 6	0.133	0.175	0.109	0.139	0.141
Observations	60	133	90	655	938

TABLE 5
(Continued)

a Fiscal-year-end quarters when firms anticipated a decline in tax rates in the near future but not necessarily the next quarter. This is the primary event period. The secondary event period is the two quarters immediately following the primary event period.

b Fiscal-year-end control quarters — for these firms, the tax-rate phase-in has already been completed but other firms, with different fiscal-year-ends, still anticipate a future tax rate decrease.

TABLE 6

Standardized Average Prediction Errors (of Selling, General and Administrative Expenses/Sales) Over Event Intervals Immediately Preceding and Following Tax Rate Changes

1. Primary Event Period[a]

	Fiscal-Year-End			
	March	June	Sept	Dec
Minimum	-2.68	-4.75	-3.94	-7.16
First Decile	-1.38	-1.65	-2.04	-1.84
Median	0.22	-0.09	0.01	0.32
Percent positive	0.57	0.47	0.51	0.57
Mean	0.40	0.25	0.40	0.47
Ninth Decile	2.61	2.37	2.50	2.91
Maximum	5.32	9.42	11.32	9.16
T-statistics	3.08	2.93	3.76	11.94
Observations	60	133	90	655

2. Secondary-Event Period[a]

Minimum	-1.55	-2.34	-2.43	-4.32
First Decile	-0.98	-1.20	-1.43	-1.47
Median	-0.29	-0.23	-0.33	-0.11
Percent positive	0.33	0.39	0.40	0.45
Mean	-0.09	-0.03	-0.05	-0.02
Ninth Decile	1.32	1.15	1.36	1.56
Maximum	2.64	5.82	6.08	13.00
T-statistics	-0.68	-0.30	-0.49	-0.39
Observations	60	133	90	655

[a] Table 4 describes the primary and secondary event periods.

---

1 The maximum marginal tax rate for any firm was 46% less 1% for each month in the firm's fiscal year following June 30, 1987. For all but June fiscal year-end firms, this meant a drop in tax rates (of 12%) phased in over two fiscal years. For a given firm, income was taxed at the same rate throughout its entire fiscal year .

2 For the December firms, the first calendar quarter of 1987 was the first fiscal quarter of a year in which income was taxed at 40% for the entire year. For the June firms, it was the third fiscal quarter of a year in which income was taxed at 46% for the entire year.

3 In other words, the tax consequences to all parties that participate in the tax-planning strategy must be factored into account (Scholes and Wolfson (1992)).

4 More generally, for the buyer, the delayed deduction could range from the full purchase price (for items that trigger immediate tax deductions) to zero (for items that are nondeductible or that must be capitalized fully), and intermediate consequences are also possible. For the special case in which the amount of deferred taxable income for the seller is equal to the amount of deferred tax deduction for the buyer, and where all firms' current and future marginal tax rates are the same, the net tax benefit to delaying sales would be zero.

5 Consistent with earlier arguments, the size of this benefit depends on the goods or services exchanged. Sales of durable goods represent particularly

good candidates for short-term income deferral for sellers. The benefit to the seller of deferring income will typically exceed the cost to the buyer of postponing a relatively small depreciation deduction. For the quarter ending December 31, 1986, however, the depreciation effect may be more important to the extent that a different depreciation schedule is implied by the timing difference.

6 Because of data limitations, we restrict our tests to firms with fiscal years ending in March, June, September, or December.

7 Quarterly gross national products were collected from the *Survey of Current Business* that is published by the U.S. Department of Commerce. This time series of GNPs was standardized by the GNP for the first quarter of 1987 and the resulting standardized GNPs were used to deflate the nominal accounting measures. As a result, the reported results are expressed in terms of (first quarter) 1987 dollars.

8 Thus, the signing convention is that the λ_{e_j}'s are positive when the related accounting variables are decreased.

9 Foster demonstrates that this model is suitable for quarterly earnings, sales, and expenses when estimated at the firm level, and we assume it is also suitable for gross margin and SG&A. A more general ARIMA model could potentially yield better estimates of the tax savings from income shifting, but the costs of pursuing this approach are prohibitive because of data limitations

(long time-series are required to estimate ARIMA models adequately) and modeling complexities (for each model, restrictions must be derived for the parameters and the algebraic difficulties increase considerably for more sophisticated models). Moreover, valuable degrees of freedom would be consumed in estimating the parameters of the more general model.

10 Finally, an examination of IBM's annual report did not reveal obvious aggressive tax planning. In fact, not surprisingly, it is difficult to assess whether their income was reduced because of exogenous factors or to save taxes. More generally, because the dollar impact of exogenous economic factors increases in firm size, care must be taken when comparing size quintile results in Panel 1. It is tempting, for example, to conclude that the fifth size quintile's average tax savings (2.243) is larger than that for the fourth size quintile (0.097). However, considering how close the average t-statistics are for these size quintiles (0.25 and 0.28, see Panel 2 of Table 3), it is clear that the difference in average tax savings is not statistically significant at conventional levels.

11 This ratio is determined by dividing the estimated tax savings by the estimated unmanaged income (pre-tax and pre-manipulation as reflected in equations (2.3)) for the two event quarters. Based on equations (2.3) unmanaged income is proxied by reported gross margin less reported SG&A plus our estimate of the shifted gross margin less our estimate of the shifted SG&A.

This measure is volatile, probably because the estimates of income shifting affect both the numerator and denominator.

12 The Tax Reform Act of 1986 may have been so demanding in terms of compliance that tax managers at smaller firms, who typically share compliance and planning responsibilities, may not have had time for planning. The median annual sales for the smallest two size quintiles are approximately $25 million and all of these firms have sales below $88.5 million (see Panel 5 of Table 3). In contrast, larger firms frequently have separate managers for compliance and planning.

13 The sales growth figures reported in panel 7 of Table 1 suggest that the smaller sample firms' operating performance was more volatile over the sample period (from the third quarter of 1982 through the second quarter of 1990).

14 The average r-squares for the gross-margin equation, in increasing order by size quintile are 0.36, 0.40, 0.48, 0.49 and 0.52. The corresponding average r-squares for the SG&A equation are 0.25, 0.41, 0.44, 0.47, 0.48.

15 The corresponding t-statistics for the size quintiles, in increasing order by size, are 0.82, 0.42, 2.71, 2.66, and 2.87.

A similar, though less significant, concern arises for firms subject to the alternative minimum tax (AMT). In his discussion remarks of this paper, however, Omer documents that there is substantial overlap between NOL and

AMT firms, and we have already demonstrated that eliminating NOL firms increases the estimated tax savings (per firm) from income shifting.

16 We are grateful to Joshua Rosett for suggesting this approach.

17 Because we are uncertain when this income shifting was reversed, we repeated all of the related tests using secondary event intervals varying in length from one to four quarters. The results were not sensitive to these choices, so only the two-quarter secondary event period results are reported.

18 To be precise, we use the modifiers "prediction" and "residual" in Table 5 to distinguish the event period out-of-sample predictions from the estimation period in-sample estimates.

19 The quarterly prediction errors have been averaged and standardized using expression (B.1) in Appendix B.

20 Specifically, a standard means-difference test was conducted between the experimental and control groups. The experimental data included one observation for each firm-quarter (between 1987, Q3 and 1988, Q1) when tax rates were still expected to decline in the future. Thus, three observations were recorded for each March firm. Similarly, the control data included three observations for each June firm.

21 Because we use the regressors in the two equations as instruments, three-stage least squares is identical to seemingly unrelated regressions as discussed on page 308 of Theil [1971].

22 The sum of the firm t-statistics divided by the square root of N * (M-k)/(M-K-2) is distributed as a z-statistic , where N is the total number of firms.

23 In principal, we could also test for whether the nonlinear restrictions across the parameters hold, although we have not done so. For example, according to our theory we should find that:

$$\Gamma^{G}[3,1] = \Gamma^{G}[6,1]\ \Gamma^{G}[2,1].$$

While nonlinear estimation would probably have to be used to test these restrictions formally, we could use the linear estimates to see if the restrictions appear to hold. Because we estimate the model separately for each firm, the non-linear approach would be extremely costly.

24 Because none of the conclusions are sensitive to these alternative weighting schemes, the results for only the first scheme are reported.

25 Note that this definition is slightly different than the one used in the above discussion in that it includes zeros for the secondary event period.