THREE ESSAYS ON TAXATION

A Dissertation

by

KIRSTEN ABRAM COOK

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2007

Major Subject: Accounting

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Approved by:	
Chair of Committee,	Michael R. Kinney
Committee Members,	Thomas C. Omer
	Thomas E. Wehrly
	Michael S. Wilkins
	Christopher J. Wolfe
Head of Department,	James J. Benjamin

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ABSTRACT

Three Essays on Taxation. (August 2007)

Kirsten Abram Cook, A.A., McLennan Community College;

B.B.A., Baylor University;

M.Acc., Baylor University

Chair of Advisory Committee: Dr. Michael R. Kinney

This dissertation contains three essays. The first essay examines the response of equity values to the announcement of a decrease in the capital gains tax rate. The Taxpayer Relief Act of 1997 reduced the long-term capital gains tax rate. News of this rate reduction reached investors in late April to early May of 1997. During the week of this event, firms with appreciated stock positions, average holding periods of at least one year, and individual marginal investors reported lower returns than companies lacking one or more of these characteristics.

The second essay builds on recent research reporting that firms establish target capital structures by weighing the costs and benefits of debt and that adjustment costs dictate how rapidly companies move toward optimal leverage ratios. If tax considerations impact debt levels of the firms, taxes are also likely to influence the rates of adjustment to target levels. Among high-tax firms, companies below the optimal leverage ratios respond more quickly than companies above the targets because high-tax firms can better utilize the interest deductions generated by issuing additional debt to reduce tax liabilities. Among low-tax firms, companies above the target capital

structures adjust more rapidly than companies below the goals because low-tax firms have less need of interest deductions to decrease tax burdens and, thus, sacrifice less tax benefit when retiring debt.

The third essay demonstrates that manufacturing firms manipulate production to manage earnings and examines whether tax incentives magnify or temper this strategy. Companies that exceed the quarterly consensus analyst forecasts absent the earnings effects of discretionary inventory changes cut production and create an earnings cookie jar for future quarters. For this sub-sample, companies make larger discretionary inventory decreases as the marginal tax rates rise in the fourth quarter relative to the first three quarters. In contrast, the sub-sample of firms that miss income goals without manipulating production use discretionary inventory increases to enhance earnings and potentially reach benchmarks. Higher tax rates do not impede miss firms from managing earnings upward; however, considerations of tax timing dissuade these companies from opportunistically manipulating production in the fourth quarter.

ACKNOWLEDGMENTS

I thank my committee chair, Dr. Kinney, and my committee members, Dr. Omer, Dr. Wehrly, Dr. Wilkins, and Dr. Wolfe, for their guidance and support throughout the course of this research. I also thank my parents for their love and encouragement.

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CHAPTER I

INTRODUCTION

This dissertation contains three essays. The first essay examines the response of equity values to the announcement of a decrease in the capital gains tax rate. The Taxpayer Relief Act of 1997 reduced the long-term capital gains tax rate from 28 to 20 percent. News of this rate reduction reached investors in late April to early May of 1997. During the event week, results indicate that firms with appreciated stock positions, average holding periods of at least one year, and individual marginal investors reported lower returns than companies with depreciated stock positions, average holding periods of less than one year, or institutional marginal investors. This stock price reaction during the event week is consistent with investors anticipating a lessening of the lock-in effect: The TRA97 rate cut decreased transaction costs for individual stockholders with long-term capital gains, and firms with marginal investors subject to the new, lower rate experienced a less favorable stock price reaction to the announcement of the cut than companies with marginal investors not subject to this reduced rate.

The second essay builds on recent research reporting that firms establish target capital structures by weighing the costs and benefits of debt and that adjustment costs dictate how rapidly companies move toward their optimal leverage ratios. If tax considerations impact firms' debt levels then taxes are also likely to influence their rates of adjustment to target levels. The purpose of this paper is to examine this issue empirically. Specifically, I hypothesize that, among high-tax firms, companies below

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This dissertation follows the style of *Journal of the American Taxation Association.*

their optimal leverage ratios respond more quickly than companies above their targets because high-tax firms can better utilize the interest deductions generated by issuing additional debt to reduce their tax liabilities. Conversely, I expect that, among low-tax firms, companies above their target capital structures adjust more rapidly than companies below their goals because low-tax firms have less need of interest deductions to decrease their tax burdens and thus sacrifice less tax benefit when retiring debt. Empirical evidence supports these predictions.

The third essay demonstrates that manufacturing firms manipulate production to manage earnings and examines whether tax incentives magnify or temper this strategy. Companies that exceed their quarterly consensus analyst forecasts absent the earnings effects of discretionary inventory changes cut production (relative to sales), creating an earnings “cookie jar” for future quarters. For this sub-sample, tax and financial reporting incentives are aligned; thus, these companies make larger discretionary inventory decreases as their marginal tax rates rise and in the fourth quarter relative to the first three quarters. In contrast, the sub-sample of firms that miss their income goals without manipulating production use discretionary inventory increases to enhance their earnings and potentially reach their benchmarks. For these companies, friction exists between tax and financial reporting incentives. Results indicate that higher tax rates do not impede miss firms from managing their earnings upward; however, tax timing considerations dissuade these companies from opportunistically manipulating production in the fourth quarter.

CHAPTER II

STOCK PRICE REACTION TO A REDUCTION IN THE CAPITAL GAINS TAX RATE

Introduction

From 1987 to 1997, individual taxpayers in the United States faced a maximum capital gains tax rate of 28 percent on capital investments held for more than one year. On August 5, 1997, President Clinton signed the Taxpayer Relief Act of 1997 (TRA97) into law. This act reduced the highest long-term capital gains tax rate from 28 to 20 percent. Investors anticipated this capital gains tax rate reduction several months before President Clinton signed the bill. News of a balanced budget agreement, including a provision for capital gains tax relief, reached investors in late April and early May of 1997. The purpose of this study is to investigate the effect of this news on stock prices.

The literature to date offers conflicting predictions concerning the impact of a change in the capital gains tax rate on security prices. Studies by Collins and Kemsley (2000) and Lang and Shackelford (2000) support tax capitalization theory and show that equity values increase when capital gains taxes decrease. To the contrary, research by Meade (1990) and Klein (1999) demonstrates that a reduction in the capital gains tax rate lowers stock sellers' transaction costs, thereby lowering stock prices. Thus, the association between capital gains taxes and equity values is unsettled and ripe for empirical investigation. My study responds to the call from Graham (2003) for "more market evidence about the importance of personal taxes affecting asset prices" (p. 1120).

To examine this relationship, I first corroborate the finding from Lang and

Shackelford (2000) that, during the event week in 1997 when news of a capital gains tax rate reduction reached the market, dividend-paying firms experienced lower returns than other companies. Then, I extend this research stream by empirically examining three mandatory conditions for capital gains tax rate changes to influence security prices. Specifically, I determine if the marginal investor realizes a capital gain or loss when selling his stock, ascertain if the marginal investor qualifies for long-term tax treatment by retaining his stock for the required holding period, and categorize the marginal investor as either an individual or an institution. I expect that stock prices reacted to news of the TRA97 rate cut in accordance with investors' positions in their stock (appreciated or depreciated), their holding periods (long- or short-term), and their tax status (individual or institutional). To this end, I adapt measures of stock price appreciation/depreciation from Guenther (2000), holding period length from Liang et al. (2002), and tax status from Ayers et al. (2002) and combine these variables in a single model to ascertain how shareholders' tax characteristics influence the impact of news of a capital gains tax rate reduction on equity values.

According to Liang et al. (2002), "If the marginal investor of a security is a nontaxable entity or is able to avoid paying capital gains taxes, then the price of that particular security will not be affected by investor-level tax rates" (p. 50). To my knowledge, my study is the first in the capital gains tax capitalization research stream to measure the tax status of the marginal investor and examine how stock price reaction differs based on this characteristic.[1]

Descriptive statistics indicate that, during the event week, firms whose stock prices appreciated in the year prior to news of the TRA97 rate cut reaching the market experienced lower returns than companies with depreciated equity values. Returns during the event week were larger for firms with short-term average holding periods than for companies with long-term average holding periods. Firms with individual marginal investors experienced a less-favorable stock price reaction during the event week than firms with institutional marginal investors. Regression results show that firms possessing all three of these characteristics (appreciated stock price, long-term average holding period, and individual marginal investor) earned lower event-week returns than companies lacking one of more of these traits; this response of equity values during the event week is consistent with investors anticipating a lessening of the lock-in effect. Although the overall stock price reaction to the news of the TRA97 tax rate cut was positive, this response was muted for firms with marginal shareholders subject to the new, lower rate (that is, individual stockholders with long-term capital gains). These results are robust to a variety of alternate sample, model, and variable specifications.

The remainder of this chapter proceeds as follows. The next section reviews previous publications that examine stock price reactions to tax rate changes. The following section lists and discusses the conditions necessary for a change in the capital gains tax rate to affect stock prices. I then detail my sample selection technique, present my hypotheses, and preview the methods that I use to test these hypotheses. The subsequent two sections present descriptive statistics and regression results, including primary tests, economic significance, and sensitivity analyses. I then compare my findings to those of a contemporaneous working paper, Dai et al. (2006). The final section concludes and outlines avenues for future research.

Background and Prior Research

Prior to TRA97, both the Tax Reform Act of 1986 (TRA86) and the Economic Recovery Tax Act of 1981 (ERTA81) modified capital gains tax rates. These two tax acts involved protracted congressional debate and numerous changes to the Internal Revenue Code (IRC). Thus, neither tax act affords researchers a clean setting for examining the stock market's reaction to a capital gains tax rate change. The same is true of the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA03), which simultaneously reduced dividend and capital gains tax rates. In contrast, TRA97 provides researchers with an uncommonly powerful setting to study stock price response. This legislation was not as complex or controversial as the other tax law changes (Shackelford 2000), and information about the capital gains tax rate reduction associated with TRA97 came as a surprise to investors (Liang et al. 2002). Thus, researchers can isolate price effects attributable to news of this change because security prices impounded the information during a brief period without other contemporaneous IRC modifications confounding the association.

Early finance studies such as Miller and Scholes (1978) assert that a corporation's dividend policy does not affect shareholder wealth or firm value. However, more recent accounting studies contradict this conclusion (for example, Harris and Kemsley 1999 and Collins and Kemsley 2000).[2] In the economics literature, Klein (1999) develops a lock-in effect model to examine the relationship between capital gains taxes and stock prices. Landsman and Shackelford (1995) define the lock-in effect as the disincentive to dispose of an appreciated asset in a taxable transaction that will generate capital gains taxes on the accrued appreciation. Klein demonstrates that stock sellers treat capital gains taxes as transaction costs and expect compensation from buyers to cover these costs, resulting in a direct association between capital gains taxes and equity values. According to Klein's model, when the capital gains tax rate falls, shareholders' willingness to sell increases and stock prices decrease.

Meade (1990) also studies the lock-in effect and provides experimental evidence complementing the prediction of Klein's model. The author reaches three conclusions. First, the imposition of a capital gains tax creates a lock-in effect. Second, this lock-in effect decreases investment in new assets. Third, reducing the capital gains tax rate mitigates the lock-in effect and increases investment in new assets. Given that investors maximize after-tax wealth by selling current investments and using the proceeds to invest in new assets with higher risk-adjusted returns, a reduction in the capital gains tax rate encourages investment in these new assets by lowering the transactions costs associated with the sale of the current investments.

Lang and Shackelford (2000) employ a traditional event-study methodology to examine the influence of an expected change in the capital gains tax rate on stock prices. The authors assume that stockholders weigh the expected capital gains tax rate more heavily when assessing firms with low dividend yields. Thus, they hypothesize and find that stock returns surrounding the announcement of a capital gains tax rate cut are negatively correlated with firm dividend yields. However, Lang and Shackelford do not study the impact of marginal investors' tax characteristics on their results; that is, the authors' regression model does not incorporate shareholders' gain/loss positions in their stock, their holding periods, or their tax status.

Required Conditions

Shackelford (2000) outlines seven conditions that must hold for a change in the capital gains tax rate to influence equity prices:

1. A change in the capital gains tax rate must force the marginal investor to revise his expectations concerning the tax rate that will apply when he disposes of his stock.
2. The marginal investor must plan to dispose of his stock in a taxable transaction such as a sale in the secondary market, a share repurchase, or a corporate liquidation.
3. If a capital gains tax rate change makes an asset attractive to a new group of investors, any upward price pressure generated by that new group purchasing the asset must not be offset by downward price pressure created by the old group of investors selling the asset to avoid declining returns.
4. The marginal investor must comply with applicable tax laws by paying the capital gains tax liability created by disposing of his stock.
5. The marginal investor must recognize a net long-term capital gain; that is, his long-term capital gains must exceed his long-term capital losses and the excess of short-term capital losses over short-term capital gains. If the investor holds only one stock, that security must have appreciated in value.
6. The marginal investor must hold his stock for a sufficient period of time to receive long-term tax treatment.
7. The marginal investor must be an individual or a flow-through entity such as a partnership or S corporation that passes capital gains to individuals.

In their review of empirical tax research, specifically those studies that examine the association between equity prices and investor taxes, Shackelford and Shevlin (2001) note that capital gains tax capitalization is a relatively unexplored area compared with dividend tax capitalization. The authors assert that one reason for the dearth of studies examining the relationship between capital gains taxes and stock prices is that the seven conditions outlined in Shackelford (2000) do not hold simultaneously for most firms. Studies such as Lang and Shackelford (2000) that investigate the impact of a capital gains tax rate change on security values implicitly assume that these seven conditions occur because some of them are difficult or impossible to test empirically. For example, without access to confidential tax return data and brokerage statements, researchers cannot verify that the marginal investor complies with tax laws by reporting the correct amount of income from capital gains and remitting the associated tax liability to the US Treasury.[3]

Other researchers have extended Lang and Shackelford (2000), but none has explicitly tested these conditions. For example, Guenther (2000) investigates whether the positive stock price reaction to the news of the TRA97 rate cut is attributable to a sellers' strike. He partitions his overall sample of dividend-paying firms into sub-samples of corporations whose stock prices increased and decreased, respectively, in the year prior to the announcement. Guenther finds that the appreciation sub-sample reacted favorably to the news while the depreciation sub-sample failed to exhibit the same response. The author concludes that, as investors postponed the sales of appreciated equity securities until the effective date of the capital gains tax rate cut, this sellers' strike explains the results from Lang and Shackelford (2000). For purposes of this study, I employ Guenther's measure of stock price appreciation/depreciation to examine the fifth required condition listed previously.[4]

Liang et al. (2002) advance the capital gains tax capitalization literature stream by investigating the impact of a stock's expected holding period on price reaction to a tax rate change. To proxy for the length of the holding period, the authors calculate the inverse of the firm's share turnover ratio, operationalized as total shares outstanding at yearend divided by shares traded during the year. They assume that, as the length of the holding period increases, the present value of the capital gains tax decreases, thereby reducing the benefit of a capital gains tax rate reduction. Thus, Liang et al. hypothesize that a firm's stock price reaction to the announcement of the rate cut inversely relates to the length of the stock's expected holding period and find evidence of this negative association. I use the authors' estimate of expected holding period length to study the sixth required condition from Shackelford (2000).

Ayers et al. (2002) examine a change in the dividend tax rate rather than the capital gains tax rate. They regress weekly abnormal stock returns surrounding the announcement of a dividend tax rate increase on firm dividend yield, the tax status of each firm's marginal investor, and the interaction of these two variables. The authors predict and find that, the higher is a firm's dividend yield, the more negative is the stock price reaction to a dividend tax rate increase. They also find that this negative effect is greater for firms with low levels of institutional ownership, an indication that the marginal investor is taxable. Ayers et al. highlight the importance of including the tax status of a firm's marginal investor in models relating stock returns to investor taxes. Thus, I borrow this measure from Ayers et al. (2002) in order to investigate the seventh required condition from Shackelford (2000).

Available data permit me to test only three of the seven requirements, and firms that lack one or more of the remaining four conditions contribute noise to my analyses. Thus, finding support for my hypotheses despite this noise would bolster the reliability of my results.

Hypotheses, Data, and Methodology

Lang and Shackelford (2000) examine the influence of dividend yield on stock price reaction to news of the capital gains tax rate reduction included in TRA97.[5] I use the following model from their study as a foundation for investigating how shareholders' tax characteristics influence the impact of the TRA97 rate cut announcement on equity values:

$$Ret_{jt} = \alpha_0 + \alpha_1 Event_t + \alpha_2 Div_j + \alpha_3 Event_t \bullet Div_j + \alpha_k X + \varepsilon_{jt} \qquad \text{(II-1)}$$

where

Ret_{jt} = raw stock return for sample firm j in week t (t includes five weeks from 4/15/97 to 5/19/97)

$Event_t$ = an indicator variable coded 1 if week t is 4/29/97 to 5/5/97 (event week) and 0 otherwise

Div_j = (a) an indicator variable coded 1 if firm j paid cash dividends on common stock for the 1996 fiscal year and 0 otherwise

(b) a continuous variable measuring firm j's cash dividends on common stock for the 1996 fiscal year deflated by firm market value at 12/31/96

X = a vector of control variables for firm j's attributes associated with returns, including size, profitability, leverage, growth opportunities, the equal-weighted market return in week t, and industry indicator variables

Table II-1 defines the variables used in all subsequent tables in the chapter.

To estimate Model (II-1), I collect relevant data for the 2,500 largest corporations in the Compustat database based on firm market value at December 31, 1996.[6] I

Table II-1. Chapter II Variable Definitions

Ret = weekly stock return for the five trading weeks from 4/15/97 to 5/19/97

Event = 1 if the trading week is 4/29/97 to 5/5/97 and 0 otherwise

DDiv = 1 if the firm paid common stock dividends for the 1996 fiscal year and 0 otherwise

CDiv = common stock dividends for the 1996 fiscal year deflated by firm market value at 12/31/96

DApp = 1 if the firm's stock price appreciated from 4/28/96 to 4/28/97 and 0 otherwise

CApp = cumulative stock return during the year from 4/28/96 to 4/28/97

DHP = 1 if the firm's common shares outstanding at 12/31/96 exceed the common shares traded during 1996 and 0 otherwise

CHP = common shares outstanding at 12/31/96 divided by common shares traded during 1996

DMarg = 1 if the firm's marginal investor is an individual and 0 otherwise

CMarg = percentage of common shares outstanding at 12/31/96 owned by individual investors

EWRet = equal-weighted weekly return of the relevant market index

Size = natural logarithm of firm market value at 12/31/96

Prof = 1996 income before extraordinary items deflated by firm market value at 12/31/96

Lev = total liabilities at 12/31/96 deflated by firm market value at 12/31/96

Grow = book value of common equity at 12/31/96 deflated by firm market value at 12/31/96 calculate firm market value as the product of closing price (Compustat data item 24) and common shares outstanding (Compustat data item 25). Of the 2,500 initial sample firms, I conduct analyses on the 1,515 companies with complete data. Table II-2 displays the derivation of this final sample size.

The response variable, Ret, is the weekly raw stock return for each sample firm for each of the five trading weeks from April 15 to May 19, 1997, obtained from the Center for Research in Security Prices (CRSP) daily stock database. For comparability of results, I select the same announcement period examined by Lang and Shackelford (2000) and Liang et al. (2002) as my event week.[7] Thus, Event is an indicator variable coded 1 for the week from April 29 to May 5, 1997, and 0 otherwise. According to Lang and Shackelford (2000), the White House and Congress appear to have resolved most of the uncertainty surrounding the balanced budget agreement and the associated capital gains tax rate reduction during this week.[8] The two weeks preceding and the two weeks succeeding the event week control for the association between firm dividend policy and stock returns during non-event periods. A positive coefficient α_1 provides evidence that share prices increased during the week that news of the capital gains tax rate reduction reached the market.

Alternatively, I could examine stock price reaction following May 7, 1997, the effective date of the TRA97 capital gains tax rate reduction. Guenther (2000) cites several articles from the popular and financial press contending that, because the timing of the rate cut remained uncertain until May 7, investors likely refrained from selling their securities during my event week (p. 4). Thus, if evidence of an attenuation of the

Table II-2. Chapter II Sample Size Derivation

Original sample containing the largest corporations in the Compustat database	2,500
Firms lacking sufficient data to calculate:	
Event- and non-event-week firm and market returns (Ret and EWRet)	415
Dividend yield (DDiv and CDiv)	445
Stock price appreciation/depreciation (DApp and CApp)	1
Holding period length (DHP and CHP)	19
Marginal investor tax status (DMarg and CMarg)	94
Control variables (Size, Prof, Lev, Grow)	11
Final sample	1,515

I rank firms based on firm market value at December 31, 1996.

lock-in effect requires documenting an increase in actual asset sales to be descriptive, the five trading days from May 7 to 13, 1997 constitute a superior event week. However, in an efficient capital market, equity values fully reflect available information. Thus, when news of the TRA97 rate cut reached the market, I assume that investors revalued the securities in their portfolios accordingly and that stock prices impounded this information immediately. That is, I posit that the announcement of the rate cut increased investors' willingness to sell their assets at some point in the future and that stock prices reacted to this anticipation of a lessening of the lock-in effect. Given that the purpose of this chapter is to determine how shareholders' tax attributes affected the impact of the announcement on equity values, the five trading days from April 29 to May 5, 1997 comprise an appropriate event week. However, in the final section of this study, I examine stock price reaction during the "effective date week" (May 7 to 13, 1997) and compare my results to those of Dai et al. (2006), a contemporaneous working paper that also ventures to distinguish between the capitalization and lock-in effects and their unique impacts on equity values surrounding the TRA97 tax rate reduction.

I use two alternate specifications of Div to represent the dividend policy of sample firms. First, DDiv is an indicator variable coded 1 for firms that paid cash dividends on common shares (Compustat data item 21) during the 1996 fiscal year and 0 otherwise. Second, CDiv is a continuous variable measuring firm dividend yield, calculated as 1996 common dividends deflated by firm market value at December 31, 1996. Consistent with Lang and Shackelford (2000), my first hypothesis is as follows:

H_1: During the event week (Event=1), firms that paid dividends (DDiv=1) experienced lower returns than companies that did not pay dividends (DDiv=0). The magnitude of underperformance increases with firm dividend yield (CDiv).

A negative coefficient for α_3 supports this hypothesis.

Following Lang and Shackelford (2000), Liang et al. (2002), and Ayers et al. (2002), I include several control variables in Model (II-1).[9] Size is the natural logarithm of firm market value at December 31, 1996. Prof represents firm profitability, defined as 1996 income before extraordinary items (Compustat data item 18) deflated by firm market value at December 31, 1996. Lev represents firm leverage, calculated as total liabilities (Compustat data item 181) divided by firm market value, both measured at December 31, 1996. Grow represents firm growth opportunities, operationalized as book value of common equity (Compustat data item 11) deflated by firm market value, both collected at December 31, 1996. EWRet is the equal-weighted weekly return of the relevant market index for each sample firm.[10] Including a market return control variable incorporates a measure of beta into the model. Thus, including beta as a separate control variable for firm risk would be redundant. To ensure that results are not driven by variation among industries, I include indicator variables for two-digit Standard Industrial Classification (SIC) code industry membership.

Consistent with the lock-in effect model from Klein (1999) and experimental evidence from Meade (1990), around the time that Congress agreed to a balanced fiscal 1998 budget in early May 1997, numerous articles in the business press predicted that a capital gains tax rate cut would depress stock prices in the short run because investors would react to this news by selling appreciated shares. For example, on May 5, 1997, *The Wall Street Journal* reported, "…a burst of selling may hit the markets, strategists say. That could be the reaction, at least temporarily, as investors with big long-term profits rush to lock in their gains" (p. C1). However, Panel B of Table II-3, which I discuss at length later in the chapter, displays that both dividend-paying and non-dividend-paying firms experienced positive returns during the event week when news of the capital gains tax rate reduction reached investors, indicating that this provision in TRA97 represented good news for the entire market. The mean return for all sample firms during the event week was 7.925 percent, supporting capitalization theory. From this evidence, Lang and Shackelford (2000) conclude, "The bull market appears to have overwhelmed any downward price pressure created by a lessening of the lock-in effect" (p. 83).

I posit that examining the relative impacts of the capitalization and lock-in effects using a sample of firms partitioned on dividend policy is inadequate because this approach does not consider how news of the capital gains tax rate reduction affected stock prices differently depending on investors' tax attributes. For example, a lower capital gains tax rate provides greater motivation for an individual investor with an appreciated position in the stock of a dividend-paying firm to sell his stock and lock in his gain at the new, lower tax rate than an institutional investor with a depreciated position in the stock of a non-dividend-paying firm. Thus, a firm's particular dividend policy is neither a necessary nor a sufficient condition to motivate its investors to dispose of their stock in the company in response to a capital gains tax rate drop. Rather, I predict that equity values also reacted to the news of the TRA97 rate cut according to investors' positions in their stock (appreciated or depreciated), their holding periods (long- or short- term), and their tax status (individual or institutional). I use Model (II-2) to investigate this prediction:

$$Ret_{jt} = \beta_0 + \beta_1 Event_t + \beta_2 Div_j + \beta_3 App_j + \beta_4 HP_j + \beta_5 Marg_j + \beta_6 Event_t \bullet Div_j + \beta_7 Event_t \bullet App_j \bullet HP_j \bullet Marg_j + \beta_k X + \varepsilon_{jt} \qquad \text{(II-2)}$$

where

App_j = (a) an indicator variable coded 1 if the firm's stock price appreciated from 4/28/96 to 4/28/97 and 0 otherwise

(b) a continuous variable measuring firm j's cumulative stock return during the year from 4/28/96 to 4/28/97

HP_j = (a) an indicator variable coded 1 if the firm's number of common shares outstanding at 12/31/96 exceed the number of common shares traded during 1996 and 0 otherwise

(b) a continuous variable measuring the number of common shares outstanding at 12/31/96 divided by number of common shares traded during 1996

$Marg_j$ = (a) an indicator variable coded 1 if firm j's marginal investor is an individual and 0 otherwise

(b) a continuous variable measuring the percentage of common shares outstanding at 12/31/96 owned by individual investors

All other variables in this model are operationalized in the same manner as those in Model (II-1).

Similar to Div in Model (II-1), I use two alternative specifications of App, HP, and Marg.[11] DApp is an indicator variable coded 1 for sample companies whose common stock increased in value during the year immediately preceding the event week and 0 otherwise. I obtain daily returns for each trading day from April 28, 1996 to April 28, 1997 for each sample firm and cumulate these returns over this 12-month period.[12] If the cumulative return is positive, I code the DApp variable for that firm as 1 and 0 otherwise. Following Guenther (2000), CApp is a continuous variable representing each firm's cumulative stock return during the 12-month accumulation period.[13]

In keeping with Liang et al. (2000), CHP is a continuous variable measuring the number of common shares outstanding at December 31, 1996 for each sample firm divided by the number of that company's common shares traded during 1996.[14] A value of 1.0 for the CHP variable indicates that all shares outstanding at yearend were traded once during the year, implying that the firm's average holding period is exactly one year. Marginal investors in firms with CHP exceeding 1.0 have long-term holding periods for their shares, and those with values under 1.0 have short-term holding periods.[15] Although this variable is not a perfect proxy for the length of the marginal investor's holding period, the magnitude of this variable and the length of the holding period are positively related. Thus, as CHP increases, so does the probability that the marginal investor in that firm's stock has held his shares for the period necessary to receive preferential long-term tax treatment. DHP is an indicator variable coded 1 for sample firms with CHP exceeding 1.0 and 0 otherwise.

Following Ayers et al. (2002), CMarg is a continuous variable capturing the percentage of a firm’s common shares outstanding owned by individual investors. To calculate this variable, I obtain institutional ownership data from CDA/Spectrum and common shares outstanding from Compustat. CDA/Spectrum collects institutions’ common stock holdings from their Form 13(f) filings with the Securities and Exchange Commission (SEC). DMarg is an indicator variable coded 1 for firms owned more than 50 percent by individual investors and 0 otherwise. My two Marg variables are imperfect measures of the tax status of a firm’s marginal investor. Institutions such as pension/retirement funds and college endowments are exempt from capital gains taxes, but not all institutions are tax-exempt organizations. For instance, CDA/Spectrum also reports the holdings of banks and other taxable investors. However, as with Ayers et al. (2002), noise in these Marg variables works against obtaining my hypothesized results.

Viewing capital gains taxes as transactions costs associated with the eventual sale of a security, I expect that firms whose investors would qualify for long-term capital gain tax treatment on disposal of their equity (that is, consistent with the fifth and sixth conditions from Shackelford (2000), shares have appreciated in value and investors have held them for more than a year) experience lower returns during the event week than companies whose investors do not qualify for this preferential tax treatment. Similarly, I conjecture that firms whose marginal investors are individuals and would owe capital gains taxes upon selling their shares (that is, in keeping with the seventh condition from Shackelford (2000), they would benefit from the rate reduction) undergo a less-favorable stock price reaction during the event week than companies whose marginal investors are institutions. However, for a change in the capital gains tax rate to impact stock prices, these three firm characteristics (appreciated stock price, long-term average holding period, and individual marginal investor, respectively) cannot exist in isolation. Rather, corporations must possess all three of these traits simultaneously, leading to my second hypothesis:

H_2: During the event week (Event=1), firms whose stocks appreciated in value in the year preceding the event week, firms with long-term average holding periods, and firms with individual marginal investors (DApp•DHP•DMarg=1) experienced lower returns than companies lacking one or more of these characteristics (DApp•DHP•DMarg=0).

A negative coefficient for β_7 supports this hypothesis. Model (II-2) controls for the differential event-week stock return between dividend-paying and non-dividend-paying firms documented by Lang and Shackelford (2000) by incorporating their interaction term Event•Div.

I estimate Model (II-2) using only the dichotomous specifications of the variables of interest. While I expect that stock return performance during the event week decreases with cumulative stock return prior to this week (CApp), holding period length (CHP), and the percentage of shares owned by individual investors (CMarg), the difficulty of interpreting a four-way interaction term in which three of the components are continuous variables (Event•CApp•CHP•CMarg) precludes me from estimating Model (II-2) using continuous specifications of these variables.

Descriptive Statistics

Panel A of Table II-3 presents descriptive statistics for sample firms in the aggregate as well as partitioned by event and non-event weeks using Event. The average weekly raw stock return was 7.925 percent during the event week (n=1515) and 0.377 percent during the four non-event weeks (n=4•1515=6060). A paired t-test confirms that the event-week value is significantly higher than the mean of the non-event-week values. The mean equal-weighted market return is also significantly higher in the event week than in the non-event weeks, highlighting the importance of including this control variable in the models.

Panels B, C, D, and E of Table II-3 present descriptive statistics for sample firms in the aggregate as well as partitioned by dividend policy using DDiv, by stock appreciation/depreciation position using DApp, by the length of the average holding period using DHP, and by the tax status of the marginal investor using DMarg. Panel B shows that approximately 67 percent of the sample firms with complete data (n=1021) paid dividends during the 1996 fiscal year. On average, the dividend yield for these firms was 2.5 percent. The remaining 33 percent (n=494) comprise the no-dividend group. During the event week, the average weekly raw stock return was 5.731 percent for dividend-paying firms and 12.458 percent for non-dividend-paying firms. A t-test verifies that these average returns are significantly different, preliminary evidence that capital gains tax capitalization theory holds for this sample as it did in Lang and Shackelford (2000). Additional t-tests in Panel B indicate that dividend paying firms are larger, more profitable, more leveraged, and experience greater growth opportunities than their non-dividend-paying counterparts. These differences underscore the need to control for these firm attributes in the multivariate models.

Table II-3. Chapter II Descriptive Statistics

Panel A. Event and Non-Event Weeks

	Means			
	(1)	(2)	(3)	(4)
	Total Sample Period	Event Week	Non-Event Weeks	Difference
Variables	(n=7575)	(Event=1, n=1515)	(Event=0, n=6060)	(2) - (3)
Ret	1.887	7.925	0.377	7.548*
EWRet	1.384	4.729	0.547	4.182*

Panel B. Dividend-Paying and Non-Dividend-Paying Firms

	Means			
	(1)	(2)	(3)	(4)
	Total Sample	Dividend-Paying	Non-Dividend-Paying	Difference
Variable	(n=1515)	(DDiv=1, n=1021)	(DDiv=0, n=494)	(2) - (3)
Ret	7.925	5.731	12.458	-6.727*
CDiv	0.017	0.025	0.000	0.025*
CApp	0.104	0.153	0.002	0.151*
CHP	14.038	17.756	6.353	11.403
CMarg	0.552	0.572	0.512	0.060*
Size	7.492	7.740	6.979	0.761*
Prof	0.046	0.058	0.021	0.037*
Lev	1.373	1.770	0.551	1.219*
Grow	0.323	0.387	0.191	0.196*

Table II-3. Continued

Panel C. Firms with Appreciated and Depreciated Stock Positions

	Means			
	(1)	(2)	(3)	(4)
	Total Sample	Appreciated	Depreciated	Difference
Variable	(n=1515)	(DApp=1, n=1037)	(DApp=0, n=478)	(2) - (3)
Ret	7.925	6.946	10.048	-3.102*
CDiv	0.017	0.019	0.012	0.007*
CApp	0.104	0.277	-0.273	0.551*
CHP	14.038	8.955	25.065	-16.109
CMarg	0.552	0.547	0.562	-0.015
Size	7.492	7.593	7.271	0.322*
Prof	0.046	0.053	0.030	0.023*
Lev	1.373	1.674	0.720	0.954*
Grow	0.323	0.341	0.284	0.057*

Table II-3. Continued

Panel D. Firms with Long-Term and Short-Term Average Holding Periods

	Means			
	(1)	(2)	(3)	(4)
	Total Sample	Long-term	Short-term	Difference
Variable	(n=1515)	(DHP=1, n=1087)	(DHP=0, n=428)	(2) - (3)
Ret	7.925	6.051	12.683	-6.632*
CDiv	0.017	0.022	0.005	0.018*
CApp	0.104	0.139	0.014	0.125*
CHP	14.038	19.342	0.567	18.774*
CMarg	0.552	0.607	0.414	0.193*
Size	7.492	7.612	7.186	0.426*
Prof	0.046	0.054	0.027	0.027*
Lev	1.373	1.627	0.727	0.900*
Grow	0.323	0.341	0.279	0.062*

Table II-3. Continued

Panel E. Firms with Individual and Institutional Marginal Investors

	Means			
	(1)	(2)	(3)	(4)
	Total Sample	Individual	Institutional	Difference
Variable	(n=1515)	(DMarg=1, n=802)	(DMarg=0, n=713)	(2) - (3)
Ret	7.925	7.042	8.917	-1.875*
CDiv	0.017	0.021	0.013	0.008*
CApp	0.104	0.089	0.120	-0.031
CHP	14.038	25.198	1.485	23.713*
CMarg	0.552	0.749	0.331	0.418*
Size	7.492	7.416	7.577	-0.161*
Prof	0.046	0.046	0.046	0.000
Lev	1.373	1.616	1.100	0.516*
Grow	0.323	0.339	0.306	0.033*

Table II-3. Continued

Panel F. Firms with DApp•DHP•DMarg=1 and DApp•DHP•DMarg=0

	Means			
	(1)	(2)	(3)	(4)
	Total Sample	DApp•DHP•DMarg=1	DApp•DHP•DMarg=0	Difference
Variable	(n=1515)	(n=483)	(n=1032)	(2) - (3)
Ret	7.925	5.325	9.141	-3.816*
CDiv	0.017	0.027	0.013	0.014*
CApp	0.104	0.267	0.027	0.239*
CHP	14.038	17.525	12.406	5.119
CMarg	0.552	0.758	0.456	0.302*
Size	7.492	7.603	7.440	0.163*
Prof	0.046	0.060	0.039	0.021*
Lev	1.373	2.124	1.021	1.103*
Grow	0.323	0.387	0.293	0.093*

* The difference in means is significant at the 0.05 level.

I calculate these means during the event week (from 4/29/97 to 5/5/97).

Panel C displays that approximately 68 percent of the sample firms with complete data (n=1037) experienced stock price appreciation during the year preceding April 28, 1997. The average stock price appreciation for these firms was 27.7 percent. The mean share price depreciation for remaining companies (n=478) was 27.3 percent. During the event week, the average weekly raw stock return was 6.946 percent for appreciated firms and 10.048 percent for depreciated firms. Panel D demonstrates that roughly 72 percent of sample companies (n=1087) had long-term average holding periods, and the average event week return for this sub-sample was 6.051 percent. In contrast, the other 28 percent of the sample (n=428) reported short-term average holding periods and an average return of 12.683 percent during the event week.[16] Panel E shows that approximately 53 percent of the sample firms (n=802) had individual marginal investors whereas the remaining 47 percent (n=713) were majority owned by institutions. During the event week, the average weekly raw stock return was 7.042 percent for individual-owned firms and 8.917 percent for institution-owned firms. T-tests reveal that the differences between the mean returns in Panels C, D, and E are significant, evidence that market reaction to the TRA97 rate cut announcement varied with the tax characteristics of the marginal investor.

Panel F partitions the total sample of 1,515 firms into sub-samples of firms with appreciated stock positions, long-term average holding periods, and individual marginal investors (DApp•DHP•DMarg=1) and corporations lacking one or more of these traits (DApp•DHP•DMarg=0). For the 32 percent of sample firms possessing all three of these characteristics (n=483), the average event week return was 5.325 percent. For the 68 percent (n=1032) missing at least one of the characteristics, the mean return was 9.141 percent. These mean returns differ significantly, supporting H_2.

To determine if these descriptive statistics are sensitive to the sample partitions on the variables of interest used in Table II-3, I divide the overall sample of 1,515 firms into quartiles based on CDiv, CApp, CHP, and CMarg, respectively.[17] Panel A of Table II-4 shows that mean raw returns during the event week fall monotonically as dividend yield increases, share price appreciates, average holding period lengthens, and percentage of individual investor ownership rises.[18] The only exception is the mean return for CApp in the fourth quartile, which is still lower than the mean return in the first quartile. Panel B demonstrates that this same pattern holds for median raw returns also.

Before proceeding with regression analyses, I examine the Pearson and Spearman correlations among the response and explanatory variables in the models. Table II-5 presents these correlation matrices. As expected, several of the explanatory variables are highly correlated with the response variable, Ret. Panel A of Table II-5 displays that the parametric and nonparametric correlations between Ret and Event are both positive and significant at the 0.01 level, evidence that news of the TRA97 capital gains tax rate cut conveyed good news to the market. Panels B and C verify that dividend-paying firms, firms with appreciated stock positions, firms with long-term average holding periods, and firms with individual marginal investors are significantly, negatively correlated with raw returns during the event week. Many of the explanatory variables are also highly correlated with one another, emphasizing the importance of

Table II-4. Average Event-Week Raw Returns by Quartile

Panel A. Mean Returns

	Quartile			
Variable	1	2	3	4
CDiv	7.406	5.570	5.354	4.595
CApp	10.973	6.637	6.068	8.028
CHP	13.224	7.109	6.338	5.042
CMarg	9.253	8.558	7.567	6.324

Panel B. Median Returns

	Quartile			
Variable	1	2	3	4
CDiv	6.326	5.594	5.282	4.297
CApp	8.464	5.642	5.110	6.373
CHP	11.615	6.078	5.642	4.304
CMarg	6.962	6.562	6.259	4.617

Table II-5. Chapter II Correlation Matrices

Panel A. Correlations between Ret and Event

	Variable	
Variable	Ret	Event
Ret		0.4206***
Event	0.4514***	

Panel B. Correlations among Ret and Dichotomous Explanatory Variables

	Variable					
Variable	Ret	DDiv	DApp	DHP	DMarg	DApp•DHP•DMarg
Ret		-0.3859**	-0.1764**	-0.3654**	-0.1145**	-0.2176***
DDiv	-0.3291***		0.2307***	0.4580***	0.0974***	0.2795***
DApp	-0.1485***	0.2307***		0.1829***	-0.0283	0.4645***
DHP	-0.3251***	0.4580***	0.1829***		0.2925***	0.4293***
DMarg	-0.1274***	0.0974***	-0.0283	0.2925***		0.6451***
DApp•DHP•DMarg	-0.2285***	0.2795***	0.4645***	0.4293***	0.6451***	

Table II-5. Continued

Panel C. Correlations among Ret and Continuous Explanatory Variables

	Variable				
Variable	Ret	CDiv	CApp	CHP	CMarg
Ret		-0.2339***	-0.1683***	-0.0220	-0.1609**
CDiv	-0.3567***		0.0871***	-0.0148	0.1854***
CApp	-0.0911***	0.1521***		-0.0212	-0.0390
CHP	-0.3541***	0.4444***	0.1162***		0.1377***
CMarg	-0.1796***	0.1777***	-0.0451*	0.57907***	

*** The coefficient is significant at the 0.01 level.

** The coefficient is significant at the 0.05 level.

* The coefficient is significant at the 0.1 level.

Pearson and Spearman correlation coefficients appear above and below the diagonals, respectively.
I calculate these correlations during the event week (from 4/29/97 to 5/5/97).

examining multicollinearity in multivariate analyses.

Regression Results

Table II-6 presents the results of estimating Model (II-1). The F-statistics (untabulated) for all models in Table II-6 are highly significant ($p<0.0001$), indicating that the overall models are valuable for predicting weekly raw stock returns. The explanatory power of Model (II-1), as measured by adjusted R^2, is approximately 22 percent when the model includes DDiv and around 19 percent when it includes CDiv. Consistent with my expectation, the coefficient α_1 on Event is positive and significant regardless of the specification of Div. Also, consistent with Lang and Shackelford (2000), the coefficient α_3 on the interaction term Event•Div is negative and significant, lending strong support to H_1; for my sample of firms, non-dividend-paying companies outperformed dividend-paying companies during the event week. This result also obtains when the control variables Size, Prof, Lev, and Grow appear in the model. Inferences are unaffected when I add industry indicator variables based on two-digit SIC codes (untabulated).

Table II-7 presents the results of estimating Model (II-2). As in Model (II-1), the F-statistics for both models in Table II-7 are highly significant ($p<0.0001$). The explanatory power of Model (II-2), gauged by adjusted R^2, is approximately 22 percent regardless of whether control variables are included or omitted. Consistent with H_2, the coefficient β_7 on the interaction term Event•App•HP•Marg is negative and significant. Thus, firms possessing all three of the testable characteristics from Shackelford (2000) (appreciated stock price, long-term average holding period, and individual marginal

Table II-6. Model (II-1) Coefficient Estimates

$Ret_{jt} = \alpha_0 + \alpha_1 Event_t + \alpha_2 Div_j + \alpha_3 Event_t \bullet Div_j + \alpha_k X + \varepsilon_{jt}$

		Dichotomous Div Variable		Continuous Div Variable	
Variable	Pred.	Coefficient	Coefficient	Coefficient	Coefficient
Intercept		-0.527***	-1.587***	-0.036	-0.639
Event	(+)	10.853***	10.853***	7.085***	7.086***
Div		0.975***	0.841***	9.709***	10.018***
Event•Div	(-)	-7.702***	-7.702***	-83.090**	-83.091**
EWRet		0.451***	0.451***	0.451***	0.451***
Size			0.153**		0.091
Prof			0.809		0.003
Lev			0.023		0.014
Grow			-0.209		-0.326
Adjusted R^2		0.221	0.221	0.194	0.194

*** The coefficient is significant at the 0.01 level.

** The coefficient is significant at the 0.05 level.

* The coefficient is significant at the 0.1 level.

Table II-7. Model (II-2) Coefficient Estimates

$Ret_{jt} = \beta_0 + \beta_1\, Event_t + \beta_2\, Div_j + \beta_3\, App_j + \beta_4\, HP_j + \beta_5\, Marg_j + \beta_6\, Event_t \bullet Div_j + \beta_7\, Event_t \bullet App_j \bullet HP_j \bullet Marg_j + \beta_k\, X + \varepsilon_{jt}$

		Dichotomous Variables	
Variable	Pred.	Coefficient	Coefficient
Intercept		-0.653***	-1.628***
Event	(+)	11.140***	11.141***
Div		0.947***	0.837***
App		0.354**	0.307**
HP		-0.111	-0.160
Marg		-0.035	0.003
Event•Div	(-)	-7.097***	-7.095***
Event•App•HP•Marg	(-)	-2.180***	-2.189***
EWRet		0.451***	0.451***
Size			0.144**
Prof			0.939
Lev			0.027
Grow			-0.206
Adjusted R^2		0.224	0.225

*** The coefficient is significant at the 0.01 level.

** The coefficient is significant at the 0.05 level.

* The coefficient is significant at the 0.1 level.

investor) underperformed firms lacking one or more of these traits during the event week. Also note that the coefficient β_6 on the interaction term Event•Div remains significantly negative. As in Model (II-1), incorporating control and industry indicator variables into Model (II-2) does not alter these results.

Pearson and Spearman correlation coefficients from Table II-5 reveal that, during the event week, the variables Div, App, HP, and Marg, as well as the interaction term App•HP•Marg, are highly correlated. Thus, I examine each explanatory variable's variance inflation factor (VIF) to determine how much of that variable's variation is explained by the other predictors in the models and ultimately if multicollinearity impacts the regression results. With the exception of certain industry indicators, no variable's VIF in any model is larger than 10, implying that multicollinearity is not a severe problem.[19]

To gauge the economic significance of the regression results, I examine the estimated coefficients from Model (II-2) in Table II-7. When the model includes control variables (Size, Prof, Lev, and Grow), the average raw return in the event week is 11.141 percent (the coefficient β_1) greater than the average raw return in non-event weeks for non-dividend-paying firms that have depreciated stock positions, short-term average holding periods, and institutional marginal investors. For dividend-paying firms, this difference in returns between event and non-event weeks drops by 6.258 percent (the sum of the coefficients β_2 and β_6) to 4.883 percent. An F-test confirms that the sum of these two coefficients is significantly less than zero ($p<0.0001$). For firms possessing all three of the testable characteristics from Shackelford (2000) (appreciated stock positions, long-term average holding periods, and individual marginal investors), this difference in returns falls by 2.039 percent (the sum of the coefficients β_3, β_4, β_5, and β_7) to 9.102 percent. An F-test verifies that the sum of these four coefficients is significantly less than zero ($p<0.0001$).

Three key results emerge from the descriptive statistics presented in Tables II-3, II-4, and II-5 and the regression results provided in Tables II-6 and II-7. First, sample firms experienced substantially larger returns during the event week than during the four non-event weeks, indicating that the announcement of the TRA97 capital gains tax rate reduction represented positive news for the market as a whole. Second, non-dividend-paying firms outperformed dividend-paying firms during the event week, and this result from Lang and Shackelford (2000) persists regardless of the other variables included in the model. Third, controlling for this dividend yield effect, firms with appreciated stock positions, average holding periods of at least one year, and individual marginal investors reported lower event-week returns than companies lacking one or more of these characteristics. While this sub-sample of firms earned significant, positive returns, implying that anticipation of a lessening of the lock-in effect did not subsume the good news inherent in the tax rate cut, the underperformance of these companies relative to the remainder of the sample is significant, both statistically and economically.

I subject my results to a battery of sensitivity analyses to determine if the findings are attributable to particular sample, model, and variable specifications. First, Liang et al. (2000) criticize Lang and Shackelford (2000) for examining only large firms, implying that incorporating smaller companies into the sample may alter conclusions.

Since the descriptive statistics and regression results presented previously obtain from a sample of 1,515 large firms (mean market value of $1,793 million), I address this potential criticism by examining as my sample all firms with complete data in the Compustat, CRSP, and CDA/Spectrum databases; this full sample contains 4,293 firms (mean market value of $200 million). Second, I re-estimate all models using the value-weighted rather than the equal-weighted weekly return of the relevant market index as a control variable. Third, I re-measure the dichotomous and continuous App variables by terminating the accumulation period on April 14, 1997. Fourth, I also cumulate returns for these App variables over 18- and 6-month time horizons (both ending on April 28, 1997) in addition to the 12-month horizon detailed previously. Fifth, I incorporate the suggestion of Phillips (2002) from his discussion of Liang et al. (2002) by re-coding the CHP variable as the log of each firm's inverse share turnover ratio rather than the raw ratio. Sixth, I re-partition the DHP variable at the median CHP value of 1.675 rather than 1.0; that is, I re-code a firm's DHP variable as 1 if that company's CHP value exceeds the median and 0 otherwise. Finally, I again re-estimate all descriptive statistics and models after winsorizing Ret, CDiv, CApp, CHP, and CMarg at both the $99^{th}/1^{st}$ and the $95^{th}/5^{th}$ percentiles. The results of these sensitivity analyses (untabulated) are qualitatively equivalent to those reported in Tables 3-7, indicating that my conclusions are not attributable to firm size, market return measure, appreciation/depreciation time horizon, holding period variable specification, or influential observations.

Comparison with Contemporaneous Research

Dai et al. (2006) also examine stock price reaction to the TRA97 capital gains tax rate reduction. The authors predict that "the capitalization effect (price increase caused by demand shift upward) will be stronger than the lock-in effect *before* the tax cut becomes effective and the lock-in effect (price decrease caused by supply shift downward) will dominate the capitalization effect *after* the tax rate cut effective date" (p. 5). They report that the capitalization effect is stronger in the week preceding the rate cut (the announcement week: April 30 to May 6, 1997) for non-dividend-paying firms (consistent with Lang and Shackelford 2000) and that the lock-in effect is stronger in the week succeeding the rate cut (the effective date week: May 7 to 13, 1997) for firms with appreciated stock price positions and high levels of institutional ownership.

Using my sample of 1,515 firms, I examine stock price reaction during the effective date week in addition to the announcement week. Specifically, I estimate full and reduced forms of the following model:

$$Ret_{jt} = \delta_0 + \delta_1\, Ann_t + \delta_2\, Eff_t + \delta_3\, Div_j + \delta_4\, App_j + \delta_5\, HP_j + \delta_6\, Marg_j + \delta_7\, Ann_t \bullet Div_j + \delta_8\, Ann_t \bullet App_j \bullet HP_j \bullet Marg_j + \delta_9\, Eff_t \bullet Div_j + \delta_{10}\, Eff_t \bullet App_j \bullet HP_j \bullet Marg_j + \delta_k\, X + \varepsilon_{jt} \quad \text{(II-3)}$$

where

Ret_{jt} = raw stock return for sample firm j in week t (t includes six weeks from 4/15/97 to 5/28/97)[20]

Ann_t = an indicator variable coded 1 if week t is 4/29/97 to 5/5/97 (announcement week) and 0 otherwise (excluding the effective date week)

Eff_t = an indicator variable coded 1 if week t is 5/7/97 to 5/13/97 (effective date week) and 0 otherwise (excluding the announcement week)

All other variables in this model are operationalized in the same manner as those in

Models (II-1) and (II-2).

Table II-8 displays the results of estimating Model (II-3). When I estimate Model (II-2) in Table II-7, I use the effective date week as a control week. In the first column of Table II-8, I essentially replicate my estimation of Model (II-2) in Table II-7, but I no longer use the effective date week as a control week. As in Model (II-2), the coefficient δ_1 on Ann is positive and significant, and the coefficients δ_7 and δ_8 on the interaction terms Ann•Div and Ann•App•HP•Marg are both negative and significant. Thus, the change in non-event weeks does not alter my findings. In the second column, I examine stock price reaction during the effective date week. The coefficient δ_9 on the interaction term Eff•Div is negative and significant, indicating that non-dividend-paying firms continue to outperform dividend-paying companies during the effective date week as they did during the announcement week. In contrast to the findings of Dai et al. (2006), the coefficient δ_{10} on the interaction term Eff•App•HP•Marg is insignificant, implying that the lock-in effect does not dominate during the effective date week for my sample of firms with appreciated stock positions, long-term average holding periods, and individual marginal investors.[21] Also note that the explanatory power of the model in the second column (2.1 percent) is much lower than that of the model in the first column (22.5 percent). In the third column, I estimate the full form of Model (II-3), which gauges stock price reaction during both the announcement and effective date weeks. None of the inferences from the first two columns of Table II-8 change; that is, non-dividend-paying firms experience significantly higher returns in both weeks, and firms possessing the three testable conditions from Shackelford (2000) experience

Table II-8. Model (II-3) Coefficient Estimates

$$Ret_{jt} = \delta_0 + \delta_1 Ann_t + \delta_2 Eff_t + \delta_3 Div_j + \delta_4 App_j + \delta_5 HP_j + \delta_6 Marg_j + \delta_7 Ann_t \bullet Div_j + \delta_8 Ann_t \bullet App_j \bullet HP_j \bullet Marg_j + \delta_9 Eff_t \bullet Div_j + \delta_{10} Eff_t \bullet App_j \bullet HP_j \bullet Marg_j + \delta_k X + \varepsilon_{jt}$$

		Dichotomous Variables		
Variable	Pred.	Coefficient	Coefficient	Coefficient
Intercept		-0.252	-0.719	-0.367
Ann	(+)	8.630***		8.626***
Eff			0.062	0.039
Div		0.446**	0.098	0.457**
App		0.423***	0.318**	0.178
HP		-0.714***	0.067	-0.590***
Marg		-0.205	-0.298**	-0.141
Ann•Div	(-)	-6.476***		-6.483***
Ann•App•HP•Marg	(-)	-1.903***		-1.874***
Eff•Div			-0.799**	-0.849**
Eff•App•HP•Marg			-0.022	0.154
EWRet		0.852***	0.851***	0.851***
Size		0.072	0.103*	0.098*
Prof		3.406**	1.379	1.432
Lev		-0.009	0.021	0.004
Grow		-0.511**	-0.245	-0.403*
Adjusted R^2		0.225	0.021	0.203

*** The coefficient is significant at the 0.01 level.
** The coefficient is significant at the 0.05 level.
* The coefficient is significant at the 0.1 level.

Ret = weekly stock return for the six trading weeks from 4/15/97 to 5/28/97
Ann = 1 if the trading week is 4/29/97 to 5/5/97 and 0 otherwise (excluding 5/7/97 to 5/13/97)
Eff = 1 if the trading week is 5/7/97 to 5/13/97 and 0 otherwise (excluding 4/29/97 to 5/5/97)

significantly lower returns than other companies during the announcement week but not during the effective date week.

Dai et al. (2006) offer two explanations for why evidence of the lock-in effect may not emerge during the effective date week. First, investors can dispose of their securities at any point during the time period that the new tax rate applies to these dispositions. Thus, benefiting from this rate reduction does not mandate immediate sales of these assets during the effective date week. Second, if investors dispose of their stock during the effective date week, they may reinvest the proceeds from these sales in other securities, yielding an insignificant stock price reaction to the rate cut for the market as a whole. The evidence that I present in Table II-8 supports a third rationale. Specifically, I propose that, when investors learned of the impending capital gains tax rate reduction during the announcement week, those stockholders who would benefit from the new lower rate (that is, individuals with accrued capital gains and long-term holding periods) revalued their equity holdings in accordance with the news. Since these investors would accept a lower pre-tax price for their shares at some point in the future in order to receive the same after-tax profit, firms that were owned by these investors experienced lower returns during the announcement week than other companies. This explanation, in conjunction with the two suggested by Dai et al., is consistent with a negative stock price reaction during the announcement week followed by a muted response during the effective date week for firms possessing the three required conditions from Shackelford (2000).

Conclusion and Future Research

This study provides evidence consistent with capital gains taxes significantly impacting stock prices during a one-week time period when news of an anticipated reduction in the capital gains tax rate reached investors. The first set of regression analyses (presented in Table II-6) demonstrates that the share prices of firms not currently paying dividends increased more during the event week than the share prices of dividend-paying companies. This result is consistent with capital gains tax capitalization theory and documents an efficient market response to news of an expected tax cut.

Theory dictates that seven conditions must hold for a change in the capital gains tax rate to influence equity prices. Prior research investigating the impact of a capital gains tax rate change on security values has assumed implicitly that these seven conditions occur without explicitly examining them. I contribute to this stream of tax research by testing three of these requirements empirically. My second set of regression results (presented in Table II-7) documents that the TRA97 rate cut influenced equity values differently depending on investors' tax attributes. Specifically, firms whose investors would benefit from the capital gains tax rate reduction upon eventual sale of their stock underperformed companies whose shareholders were ambivalent to this tax cut. That is, firms with appreciated stock positions, average holding periods of at least one year, and individual marginal investors reported lower returns during the week when news of the TRA97 capital gains rate cut reached the market than companies with depreciated stock positions, average holding periods of less than one year, or institutional marginal investors.

One limitation of this study is the error inherent in measuring the App and HP variables. Cumulating returns to capture stock price appreciation/depreciation and calculating the inverse share turnover ratio to estimate holding period length are accepted proxies in the capital gains tax capitalization literature. However, any inaccuracy in calculating the marginal investor's holding period yields measurement error in both the App and HP variables. One method to reduce this measurement error (and an avenue for future research) is to examine the stock price reaction of recent initial public offering (IPO) firms. Blouin et al. (2002) employ this approach to gauge trading volume and stock price reactions to news of the repeal of the 18-month holding period rule, a provision of the IRS Restructuring and Reform Act of 1998. While this technique would reduce sample size (and the associated power of statistical tests) and limit the generality of results, IPOs provide a clean starting date for measuring stock price appreciation/depreciation and holding period length.

Calculating the percentages of a firm's shares held by individual and institutional investors, respectively, is one method for capturing the tax status of that company's marginal investor. Alternate approaches exist. For example, the TRA97 capital gains tax rate cut affected only investors subject to US Federal income taxation. Thus, measuring the proportions of a corporation's outstanding equity owned by domestic and foreign shareholders, respectively, is also a viable proxy for the marginal investor's tax status. Lower returns during the event week for firms owned primarily by domestic stockholders (relative to companies with foreign marginal investors) would provide additional evidence of investors anticipating an attenuation of the lock-in effect in response to the capital gains tax rate reduction announcement.

Notes

1. Ayers et al. (2003) also measure the marginal investor's tax status and search for evidence of the lock-in effect. However, these authors examine the impact of shareholder-level capital gains taxes in a different context. Specifically, they "model acquisition premiums as a function of proxies for the capital gains taxes of target shareholders, taxability of the acquisition, and tax status of the price-setting shareholder as represented by the level of target institutional ownership" (p. 2783).

2. Harris and Kemsley (1999) formulate a residual-income model to demonstrate how dividend taxes influence the comparative valuation of retained earnings, contributed equity, and expected future earnings. The authors conclude that dividend taxes lower the value of expected future earnings and that overall firm value is inversely related to the dividend tax rate. Thus, their findings indicate that stock prices impound dividend taxes. Harris and Kemsley assume that stockholders receive all firm earnings as dividends, disallowing the possibility that capital gains taxes impact equity values.

    Collins and Kemsley (2000) extend the work of Harris and Kemsley (1999) by incorporating capital gains taxes into the residual-income model. The authors draw three conclusions. First, both dividend and capital gains taxes lower stockholders' valuation of the retained portion of current profits. Second, dividend taxes (but not capital gains taxes) lower the valuation of the portion of current profits that shareholders receive as dividends. Third, dividend taxes (but not capital gains taxes) lower the valuation of retained earnings. Although the first two results are intuitive, the third merits additional discussion. When investors purchase shares of stock, they implicitly pay for firms' accumulated equity. Thus, each shareholder's tax basis in his stock precludes him from paying capital gains taxes on this accumulated equity upon eventual sale of the stock. However, if the corporation distributes these accumulated profits as dividends, the shareholder owes taxes on this income. These results suggest that stockholders capitalize both dividend and capital gains taxes into stock price and that raising these tax rates decreases equity values.

The use of residual-income modeling to determine the effect of investor taxes on firm market value has generated disagreement among academics. Hanlon et al. (2003) state, "While the Ohlson model might be appropriate for analyzing the relation between prices and fundamental accounting variables under the null hypothesis of no dividend taxation, it is not clear that the model is appropriate for analyzing the alternative hypothesis that investors discount retained earnings by their marginal tax rate" (p. 121). Dhaliwal et al. (2003) also question the methodologies and findings of Harris and Kemsley (1999) and Collins and Kemsley (2000), concluding that the residual-income models used in these studies are flawed and that the related findings are unreliable. My study does not address this controversy.

3. Using panel data collected from a large sample of high-income individual

taxpayers, Auerbach et al. (1998) find that the effective tax rate on realized capital gains is near the statutory rate for all tax brackets in all sample years. The authors conclude that capital gains tax evasion is rare. Landsman et al. (2002) examine the determinants of capital gains tax compliance related to the 1989 RJR Nabisco leveraged buyout by linking confidential individual tax returns provided by the IRS with confidential shareholder records provided by RJR Nabisco. They find that compliance decreases as income increases and that, on average, taxpayers in their unique sample failed to report 11 percent of total gains.

4. Liang et al. (2002) also borrow this measure from Guenther (2000).

5. A firm's shareholders can realize capital gains on the sale of their stock only if the firm does not immediately distribute all of its earnings to these shareholders in the form of dividends. Thus, the higher a firm's dividend payout, the lower the benefit that shareholders receive from a reduction in the capital gains tax rate. If the firm retains a portion of profits rather than distributing this income to shareholders as dividends, capital gains tax capitalization theory dictates that a decrease in the capital gains tax rate increases the firm's stock price and that the rise in the stock price increases with the level of retained earnings.

6. Lang and Shackelford (2000) use the 2,000 largest US corporations reported by Datastream as their initial sample and conduct their analyses on the 1,975 firms with complete data. For comparability, I select the 2,500 largest US firms based on Compustat market value as my initial sample. Liang et al. (2002) suggest that the results from Lang and Shackelford (2000) may not extend to smaller firms. I

address this concern by re-estimating regression models using all firms with complete data as my sample, regardless of market value.

7. Guenther (2000) uses a slightly different event week: the five trading days from May 1 to 7, 1997.

8. According to Lang and Shackelford (2000), "A casual review of the business press during that [event] week reveals no particularly newsworthy events" (p. 83). Thus, large stock price movements during the event week are likely attributable to the announcement of the TRA97 capital gains tax rate cut rather than other news reaching the market simultaneously.

9. Specifically, Lang and Shackelford (2000) include Size, Prof, and Lev; Liang et al. (2002) use Size, Lev, and Grow; and Ayers et al. (2002) incorporate Size, Prof, Lev, and Grow.

10. In a sensitivity analysis, I include the value-weighted (rather than the equal-weighted) weekly return as a control variable.

11. As I explain in a subsequent section of the paper, I use only the dichotomous specifications of these variables when estimating Model (II-2). I use the continuous specifications when calculating certain descriptive statistics.

12. As investors revalued stocks in their portfolios upon learning of the impending TRA97 rate cut during the event week (from April 29 to May 5, 1997), they would have considered those securities' appreciation/depreciation from the date of acquisition until the date that they learned of the news. Thus, to accurately gauge the differential stock price reaction during the event week for firms with

appreciated and depreciated stock positions, the accumulation period for my App variables should end on April 28, 1997. Applying the same logic, Liang et al. (2002) also terminate their accumulation window immediately before the event week. However, this window overlaps with the non-event weeks during which I calculate the response variable Ret, which begin on April 15, 1997. In a sensitivity analysis, I conclude the accumulation period on April 14, 1997 to avoid this intersection.

13. In addition to measuring DApp and CApp over a 12-month period, I also calculate these variables over 6- and 18-month windows, both ending on April 28, 1997.

14. In his discussion of Liang et al. (2002), Phillips (2002) suggests calculating the natural logarithm of CHP rather than using the raw ratio. I examine this alternate variable specification in a sensitivity analysis.

15. Asserting that a CHP value of 1.0 implies an average holding period of exactly one year imposes certain assumptions on the data: First, all of the sample firms' common shares outstanding must be available for trade. Second, since I measure common shares outstanding at December 31, 1996, this number of shares must remain outstanding throughout the year; that is, sample companies neither issued nor repurchased shares during 1996. Third, holding period length is homogeneous across each firm's shareholders; that is, each share turns over identically to all other shares. While these simplifying assumptions may be implausible, the purpose of partitioning this variable at 1.0 is to facilitate the calculation of descriptive statistics and the estimation of Model (II-2) using DHP as an explanatory variable.

In a sensitivity test, I explore whether the results presented in Tables II-3, II-5, and II-7 differ if I dichotomize the variable at its median value of 1.675 rather than 1.0.

16. Liang et al. (2002) also find a significantly negative relation between returns and holding period length during the event week and assert that "…the present value of the tax benefits associated with the capital gains tax rate reduction is greater for firms with lower average holding periods" (p. 54). While I agree with their interpretation of this result, I proffer that a complementary (and perhaps more fundamental) explanation is that, as holding period length decreases, the likelihood that firms' marginal investors have held their securities for greater than one year also falls. Given that news of the TRA97 rate cut should affect only stock prices of firms exhibiting the required conditions from Shackelford (2000), investor anticipation of a lessening of the lock-in effect during the event week should apply only to companies with long-term average holding periods.
17. When partitioning the sample into quartiles based on CDiv, I remove non-dividend-paying firms.
18. To ensure that extreme values do not drive the results, I winsorize Ret at both the $99^{th}/1^{st}$ and the $95^{th}/5^{th}$ percentiles. The pattern in Table II-5 is qualitatively unaltered by this sensitivity test.
19. As an alternate multicollinearity diagnostic test, I also construct condition indices using the procedure from Belsley et al. (1980) for each model. No model has a condition index greater than 30, additional evidence that linear dependencies among explanatory variables do not influence the multivariate results.

20. All six weeks contain five trading days. The last of these six weeks extends to May 28, 1997 because markets were closed on May 26, 1997 for the Memorial Day holiday. May 6, 1997 falls between the announcement and effective date weeks and is excluded from this analysis.

21. I do not attempt to precisely replicate the primary model (eq. 12, p. 16) from Dai et al. (2006) and thus do not refute the results that these authors report. Rather, I attribute the differences between our findings to differences between our empirical methodologies. For example, Dai et al. use a different time period to control for returns during non-event weeks, measure stock price appreciation/depreciation over a different time horizon, and do not incorporate average holding period length into their study (and thus do not investigate the sixth required condition from Shackelford 2000).

CHAPTER III

PARTIAL ADJUSTMENT TOWARD TARGET CAPITAL STRUCTURES: DO TAXES MATTER?

Introduction

A long stream of corporate finance research has examined the determinants of firms' capital structures. Four primary theories have emerged. Myers (1984) proposes that firms follow a pecking order in their financing decisions, funding operations first with internally generated cash. If internal financing is insufficient, companies next issue debt; they sell new stock as a last resort. Baker and Wurgler (2002) develop a model in which firms issue stock when current market valuations of equity are high; therefore, companies' capital structures result from their attempts to time the market. Inertia theory from Welch (2004) holds that firms' capital structures vary as their stock prices fluctuate and that companies do not take steps to counteract these distortions. One common characteristic of the pecking order, market timing, and inertia theories is that firms do not establish target leverage ratios and thus do not revert to these targets following shocks. In contrast, the tradeoff theory of capital structure holds that companies determine optimal capital structures by weighing the costs and benefits of debt financing and that firms' convergence to these targets depends on various adjustments costs.

Recent studies have tested these capital structure theories empirically. Frank and Goyal (2003) and Fama and French (2005) find that firms issue equity far more often and under different circumstances than the pecking order theory predicts. Similarly, Leary and Roberts (2005) and Liu (2005) discover that the market timing and inertia theories do not accurately characterize empirical evidence. These studies conclude that a dynamic tradeoff model in which firms establish target capital structures and adjustment costs dictate the speed at which they approach these optimal levels fits the data best.

Researchers have also considered the role that taxes play in the determination of corporations' capital structures. DeAngelo and Masulis (1980) demonstrate that firms substitute non-debt tax shields such as depreciation deductions and investment tax credits for the interest deductions associated with debt, thereby reducing companies' leverage ratios. MacKie-Mason (1990) and Trezevant (1992) find that non-debt tax shields only effectively substitute for debt in firms' capital structures if those shields reduce companies' marginal tax rates. Manzon (1994) discovers that companies retire debt early to reduce their leverage ratios when their debt levels exceed their targets.

If taxes affect firms' capital structures as prior research has shown then, by logical extension, taxes may also influence how rapidly companies adjust to their target capital structures. The purpose of this chapter is to determine whether taxes serve as adjustment costs that influence the speed at which firms converge on their target leverage ratios. Specifically, I hypothesize that, among high-tax firms, companies below their optimal debt levels respond more quickly than companies above these targets because high-tax firms can better utilize the interest deductions generated by issuing additional debt to reduce their tax liabilities. Conversely, I expect that, among low-tax firms, companies above their target capital structures adjust more rapidly than companies below their goals because low-tax firms have less need of interest deductions to decrease their tax burdens and thus sacrifice less tax benefit when retiring debt.

To test these predictions, I use the partial-adjustment model from Flannery and Rangan (2006). Using a sample of 3,736 firm-year observations from years 1981-2000, I begin by replicating the model to verify that the explanatory variables impact firms' market debt ratios as prior research has discovered. Then, I employ this methodology to determine if firms' tax statuses (high or low) have a differing impact on the speeds at which they converge on their target leverage ratios depending on whether they are currently above or below these optimal levels. I find that, among low-tax firms, companies with actual debt ratios above their targets adjust more rapidly. This result is consistent with low-tax firms having a greater willingness to retire debt because of an inability to benefit from interest deductions. Among high-tax firms, companies with actual debt ratios below their targets adjust more quickly. This finding indicates that high-tax firms are better able to utilize the interest deductions associated with new debt issues to reduce their tax liabilities.

The remainder of this chapter proceeds as follows. The second section reviews prior theoretical and empirical research examining the determinants of firms' capital structures. The third section details my hypotheses, the methodology that I use to test these hypotheses, and my sample selection criteria. The fourth section presents descriptive statistics for my sample and the results of my regression analyses. The fifth section reports separate results for debt and equity adjusters. Finally, the sixth section concludes.

Previous Research

Myers (1984) coined the term "pecking order" to describe firms' preferred sequencing of financing choices for corporate operations. He traces the roots of the pecking order theory to Donaldson (1961), who writes that, “Management strongly favored internal generation as a source of new funds even to the exclusion of external funds except for occasional unavoidable ‘bulges’ in the need for funds” (p. 67). Specifically, pecking order theory contends that firms finance corporate operations first with internally generated funds because the use of cash reserves avoids the administrative and underwriting costs associated with debt and equity issues as well as the potential under-pricing of these new securities. If firms exhaust their internal funds and thus require external financing, they issue securities according to risk. That is, firms first issue debt, then hybrid securities such as mandatorily redeemable preferred stock or convertible bonds, and finally equity. Myers (1984) cites available empirical evidence supporting these pecking order predictions: According to Brealey and Myers (1984), firms financed 62 percent of capital expenditures with internal funds during the decade from 1973-1982, and new stock issues constituted six percent or less of total external financing during this period (Table 14-3, p. 291). Pecking order theory implies that firms do not establish target leverage ratios. Rather, capital structures reflect firms’ accrued needs for external funds.

Prior research has also considered whether variations in equity values impact firms’ capital structures. Using US data, Taggart (1977) finds that, to meet external financing needs, firms are more likely to issue debt when stock prices are low and stock when stock prices are high. Using British data, Marsh (1982) also finds that current market valuations, as well as past histories of security prices, influence firms’ decisions to issue debt or equity. More recently, Baker and Wurgler (2002) investigate whether market timing has a persistent effect on leverage ratios. They cite survey research by Graham and Harvey (2001), who report that more than two-thirds (66.94 percent) of CFO respondents consider the over- or under-valuation of their firms' equity when deciding whether to issue common stock. Similarly, 62.60 percent of respondents divulge that recent stock price movements impact this decision. Baker and Wurgler (2002) discover that fluctuations in equity prices have enduring impacts on firms' leverage ratios and thus conclude that "capital structure is the cumulative outcome of attempts to time the equity market" (p. 3). Similar to pecking order theory, market timing theory holds that firms lack target leverage ratios.

Welch (2004) also studies the effect of stock price changes on companies' capital structures. According to his inertia theory, firms' leverage ratios vary mechanically as their equity values change. He finds that corporations do not counteract these fluctuations in their capital structures by issuing or repurchasing debt or equity. Rather, these distortions persist over several years. Welch (2004) concludes that "stock returns are the primary known component of capital structure and capital structure changes" (p. 107). Like the pecking order and market timing theories, inertia theory also assumes that firms' leverage ratios do not converge on predetermined targets.

An alternative to the three theories outlined previously, the tradeoff theory predicts that firms have optimal leverage ratios, and these target capital structures result from balancing the benefits and costs of debt. The benefits include interest deductions that firms use to offset taxable income and thus reduce their tax liabilities. The costs include increased bankruptcy risks and agency conflicts between stock- and bondholders. When firms' leverage ratios diverge from optimal levels (due to fluctuations in stock price, unanticipated needs for external finance, etc.), the speeds at which these companies revert to their targets depend on adjustment costs. In the absence of adjustment costs, firms' leverage ratios correct immediately. At the opposite extreme, when adjustment costs are infinite, companies' capital structures remain at suboptimal levels permanently. Graham and Harvey (2001) find support for the existence of target leverage ratios. Specifically, they report that more than four-fifths (81 percent) of CFO respondents affirm that their firms have target capital structures.

Several recent studies test the predictions of the pecking order theory and question this theory's ability to accurately explain empirical evidence. Fama and French (2002) examine both the tradeoff and the pecking order theories and their expectations concerning both leverage ratios and dividend payouts. The two theories share many predictions, and the empirical evidence from Fama and French (2002) generally supports these common hypotheses. However, the authors identify one "deep wound on the pecking order" (p. 30). Specifically, they discover that small, low-leverage growth firms issue new stock to meet their external financing needs, while theory predicts that they should issue debt instead.

Frank and Goyal (2003) show that the broad predictions of pecking order theory do not hold for their sample, especially during the 1980s and 1990s; during this period, external finance was common, and equity finance was an important component. The authors calculate firms' financing deficit, a measure of their needs for external finance.

The pecking order theory predicts that the individual components of companies' financing deficits should have a dollar-for-dollar impact on corporate debt. Theory also holds that, when included in models with other conventional factors known to impact capital structure, the financing deficit should usurp the predictive power of the other variables. The empirical evidence from Frank and Goyal (2003) does not support these hypotheses. In addition, the pecking order theory should perform best for firms with severe adverse selection problems, such as small, high-growth firms with large information asymmetries. Contrary to this expectation, large firms were more likely to exhibit pecking order behavior.

Fama and French (2005) test the pecking order predictions about financing decisions by examining how often and under what circumstances firms issue and repurchase equity. The authors find evidence inconsistent with the pecking order expectation that firms rarely issue stock. They examine numerous types of equity issues, including seasoned equity offerings (SEOs), stock issued in mergers and through private placements, convertible debt, warrants, direct purchase plans, rights issues, and employee options, grants, and benefit plans. From 1973 to 1982, 67 percent of the authors' sample issued equity every year. This percentage rose to 74 percent for 1983 to 1992 and to 86 percent for 1993 to 2002. Equity issues are common among firms with moderate levels of leverage and those with financial surpluses, implying that stock is not a last resort for obtaining external funds. Fama and French (2005) conclude that "the pecking order, as the stand-alone model of capital structure proposed by Myers (1984), is dead" (p. 551).

The market timing and inertia theories also face recent criticisms for their inabilities to accurately characterize observed data. Leary and Roberts (2005) question how the costs of adjusting to target leverage ratios impact the predictions of the market timing and inertia theories: "Is the persistence that these studies [Baker and Wurgler 2002 and Welch 2004] find a consequence of firms failing to rebalance their capital structures in response to various shocks, or a consequence of costly adjustment?" (p. 2576). The authors' results indicate that firms do actively rebalance their capital structures but that adjustment costs prevent rapid reversions to optimal levels following shocks. The coefficient on the market timing variable from Baker and Wurgler (2002) declines as adjustment costs decrease, evidence that these costs influence the rate at which companies' leverage ratios revert to their targets. Leary and Roberts (2005) also discover that, when they re-estimate the model from Welch (2004), this model fails to differentiate between tradeoff and inertia theories.

Liu (2005) reaches a conclusion similar to that of Leary and Roberts (2005). She conducts a battery of tests designed to test the market timing and inertia theories and finds that "the significance of the historical market-to-book ratio in Baker and Wurgler (2002) and the historical return variable in Welch (2004) in explaining a firm's capital structure is more consistent with a dynamic trade-off theory with adjustment costs than the alternative stories presented in those papers" (p.4). Thus, like Leary and Roberts (2005), Liu (2005) concludes that a dynamic tradeoff model in which firms establish target capital structures and adjustment costs dictate the speed at which they approach these optimal levels fits the data best.

Finance research investigating the influence of taxation on firms' capital structures has a long history. This research stream begins with Modigliani and Miller (1958), in which the authors find that, in the absence of taxes, firms' capital structures do not impact their market values. When Modigliani and Miller (1963) consider that interest paid on corporate debt reduces companies' taxable income but that dividends paid to stockholders are not deductible for tax purposes, the authors conclude that firms should finance operations entirely with debt. Miller (1977) extends this stream of research by examining the impact of shareholder taxation of interest and dividends on firms' capital structures. He finds that investors with low marginal tax rates, such as tax-exempt institutions, are likely to hold bonds because the interest paid by these bonds generates little or no tax liability for these investors. Conversely, investors with high marginal tax rates are likely to hold non-dividend-paying stocks because these securities generate capital gains that are taxed more favorably than either dividends or interest. One of the underlying assumptions of Miller's study is that the highest marginal tax rate applies to all corporate taxpayers. DeAngelo and Masulis (1980) relax this assumption, introducing other elements of the Internal Revenue Code, such as depreciation deductions and investment tax credits, into the analysis. They find that, when firms substitute these non-debt corporate tax shields for debt, "these realistic tax code features imply a unique interior optimum leverage decision for each firm in market equilibrium after all supply side adjustments are taken into account" (p. 4).

Three more recent studies test the predictions of DeAngelo and Masulis (1980). To my knowledge, MacKie-Mason (1990) is the first study to establish an unambiguous association between firms' marginal tax rates and their financing choices. He argues that, if the probability of new debt issues decreases with firms' marginal tax rates because low-tax companies are unable to benefit from additional interest deductions, non-debt tax shields are only relevant if they reduce firms' marginal tax rates. Thus, he examines two non-debt tax shields with differing effects on marginal tax rates: Tax loss carryforwards imply that firms earn no taxable income and face zero marginal tax rates, while investment tax credits insinuate that companies possess profitable investment opportunities and are likely to face high marginal tax rates. MacKie-Mason (1990) finds that firms with tax loss carryforwards are less likely to issue new debt whereas investment tax credits do not lower the likelihood of selling new bonds. However, firms with sufficiently low taxable income (such that their investment tax credits offset the tax benefits of their interest deductions) are also unlikely to issue new debt, a condition known as "tax exhaustion" (p. 1473). Using the Economic Recovery Tax Act of 1981 as a natural experimental setting, Trezevant (1992) finds additional support for the debt substitution effect from DeAngelo and Masulis (1980) as well as the tax exhaustion hypothesis from MacKie-Mason (1990).[1] Manzon (1994) examines a sample of firms that retired debt early. His results indicate that (1) low-tax firms retire a greater percentage of debt than high-tax firms do and (2) firms retire debt early to reduce leverage when it exceeds a target level. These findings imply that firms possess optimal capital structures and that tax status impacts their adjustments toward these goals.

Hypotheses, Methodology, and Data

Recent empirical tests of the various capital structure theories (e.g., Leary and

Roberts 2005 and Liu 2005) reach the consensus that a dynamic tradeoff model that incorporates adjustment costs most accurately describes observed data. Tradeoff theory implies that firms establish target leverage ratios and revert to these targets following shocks. Researchers have ventured to measure that speed at which companies regress to their preferred capital structures. These studies reach vastly different conclusions depending on the samples and econometric techniques that the researchers employ. For example, using ordinary least squares regression and a sample of 157 large firms, Shyam-Sunder and Myers (1999) conclude that, “If our sample companies did have well-defined optimal debt ratios, it seems that their managers were not much interested in getting there” (p. 242). Similarly, using the Fama-MacBeth (1973) regression approach to control for cross correlation and biased standard errors and annual samples averaging more than 3,000 companies, Fama and French (2002) determine that, “The mean reversion of leverage is, however, at a snail’s pace, 7-10% per year for dividend payers and 15-18% for nonpayers” (p. 24). At the opposite end of the adjustment speed spectrum, Jalilvand and Harris (1984) employ seemingly unrelated regression, examine a sample of 108 large firms, and report that the average sample firm closes 56.12 percent of the gap between actual and target long-term debt in a given year.

More recently, Flannery and Rangan (2006) utilize a partial-adjustment model to investigate the existence of and the speed of convergence to firms’ target leverage ratios. The authors compare seven econometric techniques that could be used to estimate their partial-adjustment model. They conclude that firm and year fixed-effects panel regression with fitted rather than actual values for the lagged dependent variable is most appropriate methodology and discover that the average speed of convergence to target capital structures for firms in their sample is 34.4 percent per year. I borrow this estimation technique from Flannery and Rangan (2006) for use in this chapter.[2]

Prior research (e.g., MacKie-Mason 1990, Trezevant 1992, and Manzon 1994) demonstrates that firms' marginal tax rates influence their financing decisions and thus their observed leverage ratios. By logical extension, companies' tax statuses may also impact the speed at which they adjust to their target capital structures. Firms with high marginal tax rates can utilize the interest deductions associated with new debt issues to reduce their tax liabilities. Conversely, low-tax firms can sacrifice interest deductions by retiring debt without substantially increasing their tax burdens. Thus, I propose the following two hypotheses:

H_1: Among high-tax firms, companies below their optimal debt levels respond more quickly than companies above their targets.

H_2: Among low-tax firms, companies above their target capital structures adjust more rapidly than companies below their goals.

I use the following fixed-effects model from Flannery and Rangan (2006) as a foundation for investigating how firms' tax statuses influence their speeds of adjustment to target leverage ratios; Appendix A details the derivation of this model:

$$MDR_{jt+1} = \alpha_0 + \lambda\alpha_1 \text{ EBIT\_TA}_{jt} + \lambda\alpha_2 \text{ MB}_{jt} + \lambda\alpha_3 \text{ Dep\_TA}_{jt} + \lambda\alpha_4 \ln(\text{TA})_{jt} + \lambda\alpha_5 \text{ FA\_TA}_{jt} + \lambda\alpha_6 \text{ R\&D\_Dum}_{jt} + \lambda\alpha_7 \text{ R\&D\_TA}_{jt} + \lambda\alpha_8 \text{ Ind\_Med}_{jt} + \lambda\alpha_9 \text{ Rated}_{jt} + (1-\lambda) \text{ Pred\_MDR}_{jt} + \text{firm and year indicator variables} + \varepsilon_{jt+1} \text{ where} \quad \text{(III-1)}$$

MDR_{jt+1} = market debt ratio for firm j in year t+1

$EBIT\_TA_{jt}$ = earnings before interest and taxes, scaled by total assets, for firm j in year t

MB_{jt} = market-to-book ratio of assets for firm j in year t

Dep_TA_{jt} = depreciation expense, scaled by total assets, for firm j in year t

$\ln(TA)_{jt}$ = the natural logarithm of total assets, scaled by the consumer price index, for firm j in year t

FA_TA_{jt} = fixed assets, scaled by total assets, for firm j in year t

$R\&D\_Dum_{jt}$ = an indicator variable coded 1 if firm j does not report research and development expense in year t, and 0 otherwise

$R\&D\_TA_{jt}$ = research and development expense, scaled by total assets, for firm j in year t

Ind_Med_{jt} = industry median MDR for firm j in year t

$Rated_{jt}$ = an indicator variable coded 1 if firm j has a public debt rating in year t, and 0 otherwise

$Pred\_MDR_{jt}$ = predicted MDR for firm j in year t

λ = the speed of adjustment

The speed of adjustment (λ) represents the proportion of the gap between firms' actual and target leverage ratios that closes during one year. Rather than use actual values of MDR_{jt}, I use predicted values from the following ordinary least squares regression:[3]

$$MDR_{jt} = \alpha_0 + \alpha_1 EBIT\_TA_{jt} + \alpha_2 MB_{jt} + \alpha_3 Dep\_TA_{jt} + \alpha_4 \ln(TA)_{jt} + \alpha_5 FA\_TA_{jt} + \alpha_6 R\&D\_Dum_{jt} + \alpha_7 R\&D\_TA_{jt} + \alpha_8 Ind\_Med_{jt} + \alpha_9$$

$$Rated_{jt} + \alpha_{10}\, BDR_{jt} + \varepsilon_{jt} \text{ where} \qquad \text{(III-2)}$$

BDR_{jt} = book debt ratio for firm j in year t

This instrumental variables approach addresses the correlation between the actual values of MDR_{jt} and the error term ε_{jt+1}. Table III-1 defines the variables used in all subsequent tables in the chapter.

The explanatory variables in Model (III-1) originate in earlier capital structure studies. Specifically, Rajan and Zingales (1995) find that leverage is negatively correlated with EBIT_TA and MB and positively related to FA_TA and ln(TA). Fama and French (2002) demonstrate that leverage is negatively associated with Dep_TA and R&D_TA and positively correlated with R&D_Dum. Hovakimian, Hovakimian, and Tehranian (2004) report a direct relationship between leverage and Ind_Med. Faulkender and Petersen (2006) establish that a positive association exists between leverage and Rated.

To test my hypotheses, I partition my sample into firm-year observations in which firms' actual leverage ratios lie below and above their targets, respectively. I also classify each firm-year observation as high- or low-tax. To this end, I create the following two variables:

$Below_{jt}$ = an indicator variable coded 1 if MDR* exceeds MDR for firm j in year t, and 0 otherwise

$High\_Tax_{jt-1}$ = an indicator variable coded 1 if MTR for firm j in year t-1 is greater than top quartile (75th percentile) MTR in year t-1, and 0 if MTR for

Table III-1. Chapter III Variable Definitions

MDR$_{jt}$ = market debt ratio: [long-term debt (data 9) + debt in current liabilities (data 34)] / [(data 9) + (data 34) + common shares outstanding (data 25) • price at fiscal yearend (data 199)]

Pred_MDR$_{jt}$ = predicted value from the regression of MDR$_{jt}$ on EBIT_TA$_{jt}$, MB$_{jt}$, Dep_TA$_{jt}$, ln(TA)$_{jt}$, FA_TA$_{jt}$, R&D_Dum$_{jt}$, R&D_TA$_{jt}$, Ind_Med$_{jt}$, Rated$_{jt}$, and BDR$_{jt}$

BDR$_{jt}$ = book debt ratio: [(data 9) + (data 34)] / total assets (data 6)

EBIT_TA$_{jt}$ = profitability: earnings before interest and taxes [earnings before extraordinary items (data 18) + interest expense (data 15) + income taxes (data 16)] / (data 6)

MB$_{jt}$ = growth opportunities: [(data 9) + (data 34) + preferred stock (data 10) + (data 25) • (data 199)] / (data 6)

Dep_TA$_{jt}$ = depreciation tax shield: depreciation expense (data 14) / (data 6)

ln(TA)$_{jt}$ = firm size (in 1983 dollars): natural logarithm of [(data 6) • 1,000,000] / consumer price index

FA_TA$_{jt}$ = asset tangibility: property, plant, and equipment (data 8) / (data 6)

R&D_Dum$_{jt}$ = an indicator variable coded 1 if research and development expense (data 46) is missing, and 0 otherwise

R&D_TA$_{jt}$ = growth opportunities: (data 46) / (data 6)

Ind_Med$_{jt}$ = industry effects: industry median MDR$_{jt}$ calculated for each year based on the 48 industry groupings in Fama and French (1997)

Rated$_{jt}$ = an indicator variable coded 1 if credit rating (data 280) exists, and 0 otherwise

MTR$_{jt-1}$ = one-year lagging marginal tax rate (MTR) based on income after interest expense has been deducted

High_Tax$_{jt}$ = an indicator variable coded 1 if MTR$_{jt-1}$ is greater than third quartile MTR$_{jt-1}$ in each year, and 0 if MTR$_{jt-1}$ is less than first quartile MTR$_{jt-1}$ in each year

Below$_{jt}$ = an indicator variable coded 1 if a firm's actual MDR$_{jt}$ lies below its target MDR$_{jt}$, and 0 otherwise

Debt_Ch$_{jt}$ = issuance of long-term debt (data 111) - reduction of long-term debt (data 114)

Debt_Adj$_{jt}$ = an indicator variable coded 1 if the absolute value of Debt_Ch$_{jt}$ exceeds one percent of total assets (data 6), and 0 otherwise

Equity_Ch$_{jt}$ = sale of common and preferred stock (data 108) - purchase of common and preferred stock (data 115)

Equity_Adj$_{jt}$ = an indicator variable coded 1 if the absolute value of Equity_Ch$_{jt}$ exceeds one percent of total assets (data 6), and 0 otherwise firm j in year t-1 is less than bottom quartile (25^{th} percentile) MTR in year t-1

MDR^*_{jt} represents the target leverage ratio for firm j in year t. I calculate this variable as the predicted value of MDR_{jt} from the following ordinary least squares regression:

$$MDR_{jt} = \alpha_0 + \alpha_1 \, EBIT\_TA_{jt} + \alpha_2 \, MB_{jt} + \alpha_3 \, Dep\_TA_{jt} + \alpha_4 \ln(TA)_{jt} + \alpha_5 \, FA\_TA_{jt} + \alpha_6 \, R\&D\_Dum_{jt} + \alpha_7 \, R\&D\_TA_{jt} + \alpha_8 \, Ind\_Med_{jt} + \alpha_9 \, Rated_{jt} + \varepsilon_{jt} \quad \text{(III-3)}$$

I use High_Tax to classify firms according to tax status. To calculate High_Tax, I download companies' simulated marginal tax rates from John Graham's website (http://faculty.fuqua.duke.edu/~jgraham). If a firm's simulated marginal tax rate based on income after interest expense has been deducted in year t-1 (MTR_{jt-1}) exceeds the sample top quartile (75^{th} percentile) value for that year, I code High_Tax as 1, and 0 if MTR_{jt-1} lies below the sample bottom quartile (25^{th} percentile) value.[4,5]

To test H_1, I examine the sample of firm-year observations for which High_Tax assumes a value of 1. I then divide this sample into two sub-samples based on Below. I separately estimate Model (III-1) for the two sub-samples with Below values of 1 and 0, respectively, and compare the value of λ from these two regressions. A higher value of λ for firms below their optimal debt levels relative to firms above these targets supports H_1. To test H_2, I examine the sub-sample of firm-year observations for which High_Tax assumes a value of 0. For this sub-sample, a higher value of λ for firms above their target capital structures relative to firms below these goals supports H_2.

Alternatively, to test H_1 and H_2, I add Below as an additional explanatory variable to Model (III-1), interact Pred_MDR with Below, and estimate this expanded model separately for high- and low-tax firms, respectively. For high-tax companies, a negative coefficient on the interaction term Pred_MDR • Below implies that firms below their optimal debt levels move more quickly toward their target capital structures than firms above these targets, support for H_1. For low-tax companies, a positive coefficient on the interaction term Pred_MDR • Below implies that firms above their target capital structures adjust more rapidly toward their optimal debt levels than firms below these goals, support for H_2.

My initial sample contains 247,048 firm-year observations from 1980 to 2001 from the Compustat database.[6,7] Following Flannery and Rangan (2006), I delete utilities (SIC codes 4900-4999) and financial firms (SIC codes 6000-6999) and classify the remaining firms into the industry groupings from Fama and French (1997), eliminating 62,382 observations. I merge these data with consumer price index (CPI) data from the Research Division of the Federal Reserve Bank of St. Louis (http://research.stlouisfed.org/fred2/categories/9) and simulated marginal tax rate data calculated by John Graham (http://faculty.fuqua.duke.edu/~jgraham), purging an additional 25,368 observations. I also remove observations with missing or illogical values for the fields needed to calculate the response and explanatory variables in Models (III-1) and (III-2). This cut reduces the sample size by 104,916 observations. Calculating one-year-ahead market debt ratios to estimate Model (III-1) and purging firm-year observations with lagged marginal tax rates between the first and third quartile values decrease the sample by 11,667 and 35,391 observations, respectively. To estimate a regression model with firm fixed effects, I require at least two years of data for each sample firm. This requirement eliminates 3,588 observations and yields a final sample of 3,736 firm-year observations. I winsorize all continuous variables at the 1st and the 99th percentiles to lessen the effect of outlying observations on regression results.

Results

Table III-2 presents descriptive statistics for my sample of 3,736 firm-year observations. Overall, these summary statistics are similar to those reported by Flannery and Rangan (2006) in their Table 1 (p. 474), despite the different sample periods that we use in our studies. The mean market debt ratio for my sample (0.3056) is higher than the mean value for their sample (0.2783), but my median values are close (0.2249 and 0.2252, respectively). Both mean (18.2400) and median (18.1126) firm size (measured as the natural logarithm of total assets in 1983 dollars) for their sample exceed these statistics for my sample (13.8807 and 14.0322, respectively). If small firms adjust their leverage ratios more quickly than large firms due to the lower costs associated with acquiring bank debt relative to issuing public debt, I expect that firms in my sample converge to their optimal capital structures at a more rapid pace than companies in the study by Flannery and Rangan (2006). The mean values for High_Tax and Below indicate that (1) I classify 42.85 percent of firm-year observations in my sample as high-tax and (2) 61.22 percent of firm-year observations have actual market debt ratios that lie below the target levels predicted by Model (III-3). Among high-tax firms, values of MTR_{jt-1} range from 34 percent to 46 percent; for low-tax companies, these minimum and maximum values are 0 percent and 9 percent, respectively.

Table III-2. Chapter III Descriptive Statistics

Variable	N	Mean	Std. Dev.	Min.	Median	Max.
MDR_{jt}	3,736	0.3056	0.2499	0.0010	0.2249	0.9486
MDR_{jt+1}	3,736	0.3166	0.2582	0.0009	0.2396	0.9668
$Pred\_MDR_{jt}$	3,736	0.3227	0.1852	0.0005	0.2954	0.9966
BDR_{jt}	3,736	0.3234	0.2441	0.0031	0.2758	1.2764
$EBIT\_TA_{jt}$	3,736	0.0042	0.2348	-1.3316	0.0710	0.3250
MB_{jt}	3,736	1.4721	1.1233	0.3055	1.1752	10.9849
Dep_TA_{jt}	3,736	0.0543	0.0361	0.0061	0.0457	0.2210
$\ln(TA)_{jt}$	3,736	13.8807	2.2883	9.2215	14.0322	18.9267
FA_TA_{jt}	3,736	0.6282	0.3891	0.0454	0.5634	2.1623
$R\&D\_Dum_{jt}$	3,736	0.5166	0.4998	0	1	1
$R\&D\_TA_{jt}$	3,736	0.0401	0.0929	0	0	0.6874
Ind_Med_{jt}	3,736	0.2459	0.1108	0.0427	0.2389	0.5353
$Rated_{jt}$	3,736	0.2717	0.4449	0	0	1
$High\_Tax_{jt}$	3,736	0.4285	0.4949	0	0	1
MTR_{jt-1} ($High\_Tax_{jt} = 1$)	1,601	0.3546	0.0155	0.3400	0.3500	0.4614
MTR_{jt-1} ($High\_Tax_{jt} = 0$)	2,135	0.0034	0.0056	0.0000	0.0000	0.0911
$Below_{jt}$	3,736	0.6122	0.4873	0	1	1

Before proceeding with regression analyses, I examine the Pearson and Spearman correlations among the variables in Models (III-1) and (III-2). Table III-3 presents this correlation matrix. As expected, each of the explanatory variables is highly correlated with MDR_{jt} and MDR_{jt+1}, my measures of leverage. With the exception of Dep_TA and ln(TA), each of these correlations has the sign predicted by prior research. While Dep_TA could proxy for firms' depreciation tax shields, implying that larger depreciation expense reduces the need for the interest deductions generated by debt, this variable could also proxy for asset tangibility since fixed assets generate depreciation deductions. The latter scenario implies a positive relationship between MDR and Dep_TA. The negative correlation between ln(TA) and the response variables may stem from a greater percentage of small firms in my sample relative to the sample from Flannery and Rangan (2006).

Most of the explanatory variables are highly correlated with one another, indicating that some of the variables may capture the same underlying construct. For example, both the Pearson and Spearman correlations between MB and R&D_TA are positive and highly significant, indicating that both of these variables may proxy for companies' growth opportunities. These large correlations among explanatory variables indicate that multicollinearity may adversely affect regression results.

Before proceeding with tests of H_1 and H_2, which require partitioning my total sample into sub-samples according to tax status (high or low) and leverage position (below or above target), I estimate three variations of Model (III-1) using all 3,736 firm-year observations. Table III-4 presents these results. First, I regress MDR_{jt} on the first

Table III-3. Chapter III Correlation Matrix

	Variable							
Variable	MDR$_{jt}$	MDR$_{jt+1}$	Pred_MDR$_{jt}$	BDR$_{jt}$	EBIT_TA$_{jt}$	MB$_{jt}$	Dep_TA$_{jt}$	ln(TA)$_{jt}$
MDR$_{jt}$		0.86857***	0.86139***	0.72404***	-0.11080***	-0.31698***	0.06754***	-0.09721***
MDR$_{jt+1}$	0.85913***		0.78104***	0.65690***	-0.08999***	-0.26514***	0.04117**	-0.10235***
Pred_MDR$_{jt}$	0.91601***	0.81106***		0.89563***	-0.17484***	-0.16917***	0.08015***	-0.11927***
BDR$_{jt}$	0.81859***	0.72377***	0.89213***		-0.28784***	0.21412***	0.16954***	-0.09761***
EBIT_TA$_{jt}$	-0.29246***	-0.25026***	-0.29695***	-0.25700***		-0.35013***	-0.35385***	0.44951***
MB$_{jt}$	-0.54818***	-0.45895***	-0.36638***	-0.05311***	0.18334***		0.11225***	-0.10259***
Dep_TA$_{jt}$	0.02202	-0.00569	0.00446	0.04829***	-0.13151***	0.05223***		-0.20626***
ln(TA)$_{jt}$	-0.06146***	-0.05999***	-0.10843***	-0.03990**	0.46640***	0.06121***	-0.11820***	
FA_TA$_{jt}$	0.10334***	0.08844***	0.10888***	0.07152***	0.02116	-0.07021***	0.58627***	0.01904
R&D_Dum$_{jt}$	0.20375***	0.22085***	0.27201***	0.14503***	0.04944***	-0.15479***	0.00898	0.02528
R&D_TA$_{jt}$	-0.25650***	-0.27519***	-0.31664***	-0.16631***	-0.15068***	0.21368***	0.04522***	-0.12371***
Ind_Med$_{jt}$	0.35011***	0.33653***	0.47875***	0.20976***	0.06327***	-0.30375***	0.02095	0.11735***
Rated$_{jt}$	0.05691***	0.04069**	0.02209	0.11579***	0.23579***	0.07860***	-0.04063**	0.66116***
MTR$_{jt-1}$	-0.26560***	-0.23766***	-0.27816***	-0.25187***	0.54694***	0.08955***	-0.08020***	0.51784***
High_Tax$_{jt}$	-0.29512***	-0.26138***	-0.30322***	-0.25717***	0.57809***	0.14511***	-0.06377***	0.59384***
Below$_{jt}$	-0.71384***	-0.63658***	-0.63345***	-0.69188***	0.23461***	0.27265***	0.02359	0.11102***

Table III-3. Continued

Variable	FA_TA_{jt}	$R\&D\_Dum_{jt}$	$R\&D\_TA_{jt}$	Ind_Med_{jt}	$Rated_{jt}$	MTR_{jt-1}	$High\_Tax_{jt}$	$Below_{jt}$
MDR_{jt}	0.10249***	0.19260***	-0.16533***	0.34922***	0.01919	-0.33214***	-0.33406***	-0.74113***
MDR_{jt+1}	0.08478***	0.20714***	-0.17998***	0.33156***	0.00161	-0.30330***	-0.30565***	-0.66011***
$Pred\_MDR_{jt}$	0.11951***	0.25099***	-0.15442***	0.44649***	0.01318	-0.31646***	-0.31809***	-0.62676***
BDR_{jt}	0.10714***	0.10832***	0.03594**	0.15462***	0.07290***	-0.29104***	-0.29081***	-0.64323***
$EBIT\_TA_{jt}$	-0.09121***	0.13030***	-0.56007***	0.15419***	0.21070***	0.42273***	0.42128***	0.09607***
MB_{jt}	0.01011	-0.13990***	0.37076***	-0.24531***	-0.00840	-0.01768	-0.01416	0.06709***
Dep_TA_{jt}	0.53771***	0.03667**	0.17405***	0.02630	-0.06952***	-0.15286***	-0.15161***	-0.01465
$\ln(TA)_{jt}$	-0.04872***	0.02280	-0.25292***	0.10785***	0.64748***	0.57576***	0.58396***	0.10682***
FA_TA_{jt}		0.14800***	-0.00884	0.16957***	0.03058*	-0.02238	-0.01973	0.02500
$R\&D\_Dum_{jt}$	0.12593***		-0.44609***	0.40912***	0.04173**	0.01735	0.01941	0.02808*
$R\&D\_TA_{jt}$	-0.13540***	-0.93219***		-0.38367***	-0.14935***	-0.19341***	-0.19276***	-0.01471
Ind_Med_{jt}	0.19719***	0.42908***	-0.50827***		0.09302***	-0.00289	-0.00316	-0.01268
$Rated_{jt}$	0.04977***	0.04173**	-0.10318***	010739***		0.29233***	0.29917***	0.04528***
MTR_{jt-1}	0.02584	0.00010	-0.06553***	-0.01873	0.25221***		0.99801***	0.29125***
$High\_Tax_{jt}$	0.04507***	0.01941	-0.08206***	0.00372	0.29917***	0.87292***		0.29299***
$Below_{jt}$	0.03618**	0.02808*	-0.01428	-0.00451	0.04528***	0.27487***	0.29299***	

*** The coefficient is significant at the 0.01 level.

** The coefficient is significant at the 0.05 level.

* The coefficient is significant at the 0.1 level.

Pearson and Spearman correlation coefficients appear above and below the diagonals, respectively.

Table III-4. Model (III-1) Coefficient Estimates

		Response Variable					
Variable	Prediction	MDR_{jt}		MDR_{jt+1}		MDR_{jt+1}	
Intercept	?	-0.1183		-0.6674	***	-0.7960	***
$EBIT\_TA_{jt}$	-	-0.2098	***	-0.1026	***	-0.0098	
MB_{jt}	-	-0.0598	***	-0.0186	***	-0.0030	
Dep_TA_{jt}	-	0.1248		0.1179		0.2253	
$\ln(TA)_{jt}$	+	0.0188	***	0.0537	***	0.0543	***
FA_TA_{jt}	+	0.1033	***	0.0549	***	0.0290	*
$R\&D\_Dum_{jt}$	+	0.0294	**	0.0574	***	0.0473	***
$R\&D\_TA_{jt}$	-	-0.1211	**	-0.0321		-0.0056	
Ind_Med_{jt}	+	0.3665	***	0.2201	***	-0.0090	
$Rated_{jt}$	+	0.0314	***	-0.0111		-0.0154	
$Pred\_MDR_{jt}$	+					0.4372	***
λ						0.5628	
N		3,736		3,736		3,736	
R^2		91.56%		86.32%		87.25%	

I estimate these coefficients using fixed-effects models.

Tests for no fixed effects yield highly significant F-statistics (p<0.0001) for all models.

I omit firm and year indicator variables from the table for concision.

*** The coefficient is significant at the 0.01 level.

** The coefficient is significant at the 0.05 level.

* The coefficient is significant at the 0.1 level.

nine explanatory variables, excluding $Pred\_MDR_{jt}$. With the exception of Dep_TA, coefficients for these explanatory variables are statistically significant in the expected direction. Second, I regress MDR_{jt+1} on these first nine independent variables and find that R&D_TA and Rated are no longer significant predictors of one-year leading leverage. Finally, I regress MDR_{jt+1} on these nine explanatory variables and $Pred\_MDR_{jt}$. The coefficient on Pred_MDR is positive and significant. However, many of the other independent variables (EBIT_TA, MB, and Ind_Med) lose their predictive power. These results indicate that, for my sample, eight of the first nine explanatory variables share associations with leverage that prior research documents; however, when I add Pred_MDR to the model, this variable usurps predictive power.

Tests for no fixed effects (untabulated) yield highly significant F-statistics ($p<0.0001$), indicating the importance of controlling for firm and year fixed effects by including indicator variables in Model (III-1). The explanatory power of Model (III-1), as measured by R^2, is 87.25 percent.[8] The $(1-\lambda)$ coefficient on Pred_MDR (0.4372) implies that the average sample firm closes approximately 56 percent of the gap between its actual and target leverage ratio per year. This λ value is greater than the 34.4 percent reported by Flannery and Rangan (2006). This more rapid average adjustment speed may stem from our different sample periods and the presence of smaller firms in my sample.

The Pearson and Spearman correlation coefficients from Table III-3 reveal that many of the explanatory variables in Model (III-1) are highly correlated. Thus, I examine each explanatory variable's variance inflation factor (VIF) to determine how much of that variable's variation is explained by the other predictors in the model and ultimately if multicollinearity impacts the regression results. No variable's VIF is larger than 3.0, implying that multicollinearity is not a severe problem.

I first test H_1 by examining a sub-sample of high-tax firms (High_Tax=1). To determine whether the speed of adjustment differs between firms below and above their target leverage ratios, I divide this sub-sample of 1,601 firm-year observations according to their values of Below, yielding 1,244 firms below their optimal debt levels (77.7 percent) and 357 companies above their goals (22.3 percent). I estimate Model (III-1) separately for these two groups, and Table III-5 displays the results. Among the firms below their targets, the coefficient on Pred_MDR is 0.3944, and λ is approximately 61 percent. By contrast, for the companies above their targets, the coefficient on Pred_MDR is 0.5820, implying a λ value of almost 42 percent. Thus, when comparing speeds of convergence for high-tax firms, I find support for H_1. Consistent with my prediction, high-tax firms below their optimal debt levels appear to respond more quickly than high-tax companies above their targets.

I first test H_2 using the same approach. I study a sub-sample of 2,135 low-tax firm-year observations (High_Tax=0), 1,043 of which have actual leverage ratios below their targets (48.9 percent) and 1,092 of which have debt levels above their goals (51.1 percent). The values of λ for these two groups are approximately 52 percent and 72 percent, respectively. Thus, among low-tax firms, I find support for H_2; firms above their capital structure targets seem to respond more quickly to shocks than companies below these goals.[9]

In Table III-6, I re-test H_1 and H_2 by adding Below to Model (III-1) as a main

Table III-5. Model (III-1) Coefficient Estimates, Partitioned on $High\_Tax_{jt}$ and $Below_{jt}$

		$High\_Tax_{jt} = 1$				$High\_Tax_{jt} = 0$			
Variable	Prediction	$Below_{jt} = 1$		$Below_{jt} = 0$		$Below_{jt} = 1$		$Below_{jt} = 0$	
Intercept	?	-0.6331	**	-0.6519		-0.9012	***	-0.4155	*
$EBIT\_TA_{jt}$	-	-0.1448	***	-0.0835		-0.0125		-0.0025	
MB_{jt}	-	-0.0035		0.0136		0.0190		-0.0089	
Dep_TA_{jt}	-	0.1100		-0.9647		0.1519		0.3149	
$\ln(TA)_{jt}$	+	0.0532	***	0.0500		0.0528	***	0.0525	***
FA_TA_{jt}	+	0.0609	*	0.1857	*	0.0249		0.0219	
$R\&D\_Dum_{jt}$	+	-0.0405		0.0554		0.0846	***	0.0328	
$R\&D\_TA_{jt}$	-	0.0638		-0.6813	*	-0.0235		0.1218	
Ind_Med_{jt}	+	-0.1566		0.2432	*	0.0236		0.0140	
$Rated_{jt}$	+	0.0030		-0.0793		0.0068		-0.0223	
$Pred\_MDR_{jt}$	+	0.3944	***	0.5820	***	0.4821	***	0.2800	***
λ		0.6056		0.4180		0.5179		0.7200	
N		1,244		357		1,043		1,092	
R^2		78.82%		87.95%		73.21%		79.34%	

The response variable is MDR_{jt+1}.

I estimate these coefficients using fixed-effects models.

I omit firm and year indicator variables from the table for concision.

*** The coefficient is significant at the 0.01 level.

** The coefficient is significant at the 0.05 level.

* The coefficient is significant at the 0.1 level.

Table III-6. Model (III-1) Coefficient Estimates, Partitioned on $High\_Tax_{jt}$

Variable	Prediction	$High\_Tax_{jt} = 1$		$High\_Tax_{jt} = 0$	
Intercept	?	-0.6295	**	-0.4853	***
$EBIT\_TA_{jt}$	-	-0.1372	**	-0.0046	
MB_{jt}	-	0.0037		-0.0024	
Dep_TA_{jt}	-	-0.1760		0.2801	
$\ln(TA)_{jt}$	+	0.0484	***	0.0539	***
FA_TA_{jt}	+	0.0574	*	0.0215	
$R\&D\_Dum_{jt}$	+	-0.0359		0.0747	***
$R\&D\_TA_{jt}$	-	-0.4430	*	0.0043	
Ind_Med_{jt}	+	-0.0213		0.0041	
$Rated_{jt}$	+	-0.0266		-0.0122	
$Pred\_MDR_{jt}$	+	0.6421	***	0.3181	***
$Below_{jt}$	?	0.0637	**	-0.1294	***
$Pred\_MDR_{jt} \bullet Below_{jt}$	- / +	-0.2860	***	0.1231	**
λ - firms below targets		0.6439		0.5587	
λ - firms above targets		0.3579		0.6819	
N		1,601		2,135	
R^2		87.52%		86.09%	

The response variable is MDR_{jt+1}.
I estimate these coefficients using fixed-effects models.
I omit firm and year indicator variables from the table for concision.

*** The coefficient is significant at the 0.01 level.
** The coefficient is significant at the 0.05 level.
* The coefficient is significant at the 0.1 level.

effect and interacting this variable with Pred_MDR to determine the impact of tax status on firms' speeds of adjustment to their target capital structures. When I examine high-tax firms (High_Tax=1), I find a significantly positive coefficient for Pred_MDR (0.6421) and a significantly negative coefficient for Pred_MDR • Below (-0.2860), implying that λ approximates 64 percent and 36 percent for firms below and above their target debt levels, respectively. Thus, I find additional support for H_1; the significantly negative coefficient for Pred_MDR • Below indicates that firms below their optimal debt levels converge on their targets more rapidly than companies above their goals. Focusing on low-tax firms (High_Tax=0), results indicate that firms above their optimal leverage ratios adjust more rapidly than companies below their targets. These λ values approximate 68 percent and 56 percent, respectively. The interaction term Pred_MDR • Below is positive and highly significant, providing support for H_2.

Separate Analyses of Debt and Equity Adjusters

Hypotheses 1 and 2 assume that firms converge on target leverage ratios by issuing or retiring debt (debt adjusters). However, companies may also achieve this goal by selling or repurchasing equity (equity adjusters). Since interest paid on debt is deductible for tax purposes while dividends paid on stock are not, the tax motivations associated with these securities differ. Thus, Hypotheses 1 and 2 should obtain for debt adjusters but not for equity adjusters. I borrow the empirical methodology from Hovakimian, Opler, and Titman (2001) to identify and separately examine debt and equity adjusters. Specifically, I create the following two variables:

$Debt\_Adj_{jt}$ = an indicator variable coded 1 if the absolute value of Debt_Ch exceeds one percent of total assets, and 0 otherwise

$Equity\_Adj_{jt}$ = an indicator variable coded 1 if the absolute value of Equity_Ch exceeds one percent of total assets, and 0 otherwise

I define Debt_Ch as the difference between firms' issuances and reductions of long-term debt during the current year. Positive values for Debt_Ch indicate that firms assumed additional liabilities, and negative values imply debt retirements. I define Equity_Ch as the difference between firms' sales and repurchases of stock during the current year.[10] Positive values for Equity_Ch signify that companies issued equity, and negative values denote stock repurchases. I classify firms as debt or equity adjusters, respectively, if the absolute value of Debt_Ch or Equity_Ch exceeds one percent of total assets.[11]

Table III-7 presents the results of separately analyzing debt and equity adjusters. As in Table III-6, I first examine a sub-sample of high-tax firms (High_Tax=1). Within this sub-sample, debt adjusters (Debt_Adj =1) with leverage ratios below their targets adjusted more rapidly (λ=0.6029) than debt adjusters with liability levels above their goals (λ=0.2004), and this difference in adjustment speeds is statistically significant. However, for high-tax equity adjusters (Equity_Adj=1), the difference in adjustments speeds between companies below and above their optimal capital structures is statistically insignificant. I next investigate a sub-sample of low-tax firms (High_Tax=0). As predicted, debt adjusters in this sub-sample with leverage ratios above their targets closed approximately 18 percent more of this gap than debt adjusters with liability levels below their goals, and this λ difference is highly significant. In contrast, among low-tax equity adjusters, the coefficient on Pred_MDR • Below lacks

Table III-7. Model (III-1) Coefficient Estimates, Partitioned on $High\_Tax_{jt}$ and $Debt\_Adj_{jt}$ / $Equity\_Adj_{jt}$

		$High\_Tax_{jt} = 1$		$High\_Tax_{jt} = 0$	
Variable	Prediction	$Debt\_Adj_{jt} = 1$	$Equity\_Adj_{jt} = 1$	$Debt\_Adj_{jt} = 1$	$Equity\_Adj_{jt} = 1$
Intercept	?	-0.9461 ***	-0.1365	-0.7884 ***	-0.5647
$EBIT\_TA_{jt}$	-	-0.1518 **	-0.0199	0.0169	0.0189
MB_{jt}	-	0.0104	0.0039	0.0022	0.0003
Dep_TA_{jt}	-	0.0324	-0.4533	0.2411	0.7150
$\ln(TA)_{jt}$	+	0.0592 ***	0.0077	0.0579 ***	0.0614 ***
FA_TA_{jt}	+	0.0761 *	0.0565	0.0091 **	-0.0834
$R\&D\_Dum_{jt}$	+	0.0143	-0.0954	0.1051 ***	0.0623
$R\&D\_TA_{jt}$	-	-1.4490 ***	-1.0622 ***	0.0654	0.2852
Ind_Med_{jt}	+	-0.0825	0.0305	0.0511	-0.1119
$Rated_{jt}$	+	-0.0419	-0.0082	-0.0243	-0.0064
$Pred\_MDR_{jt}$	+	0.7996 ***	0.6594 ***	0.3194 ***	0.1546 *
$Below_{jt}$	?	0.1411 ***	0.0747	-0.1578 ***	-0.0908
$Pred\_MDR_{jt} \bullet Below_{jt}$	- / ? / + / ?	-0.4025 ***	-0.1659	0.1849 **	0.1782
λ - firms below targets		0.6029	0.5065	0.4957	0.6672
λ - firms above targets		0.2004	0.3406	0.6806	0.8454
N		982	519	1,538	557
R^2		87.99%	88.99%	86.26%	81.37%

Table III-7. Continued

The response variable is MDR_{jt+1}.
I estimate these coefficients using fixed-effects models.
Tests for no fixed effects yield highly significant F-statistics ($p<0.0001$) for all models.
I omit firm and year indicator variables from the table for concision.

*** The coefficient is significant at the 0.01 level.
** The coefficient is significant at the 0.05 level.
* The coefficient is significant at the 0.1 level.

significance. These results in Table III-7 are consistent with debt adjusters capitalizing on the tax benefits of leverage. That is, high-tax debt adjusters below their target debt ratios adjust rapidly toward these goals, likely because these companies benefit from the interest deductions that additional debt provides. Similarly, low-tax debt adjusters above their optimal capital structures move quickly toward these targets, evidently because these firms abandon little or no tax benefit upon retiring debt. This pattern does not exist for equity adjusters, presumably because these companies lack the tax motivations that debt adjusters enjoy.

Conclusion

Recent research indicates that firms establish target capital structures by weighing the costs and benefits of debt and that adjustment costs dictate how rapidly companies move toward their optimal leverage ratios. If tax considerations impact firms' debt levels then taxes are also likely to influence their rates of adjustment to target levels. The purpose of this chapter is to examine this issue empirically. Specifically, I hypothesize that, among high-tax firms, companies below their optimal leverage ratios respond more quickly than companies above these targets because high-tax firms can better utilize the interest deductions generated by issuing additional debt to reduce their tax liabilities. Conversely, I expect that, among low-tax firms, companies above their target capital structures adjust more rapidly than companies below their goals because low-tax firms have less need of interest deductions to decrease their tax burdens and thus sacrifice less tax benefit when retiring debt. Empirical evidence supports these predictions.

Notes

1. The Economic Recovery Tax Act of 1981 accelerated the rate at which firms depreciated fixed assets by shortening their lives for cost recovery purposes. This legislation also created a new tax credit for research and development expenditures and extended the useful life of tax loss carryforwards from seven to 15 years.
2. Maddala (1986) considers a partial-adjustment model of dividend payments and states that such a model "assumes that dividends can be changed continuously. It does not capture the fact that dividends are increased in discrete jumps" (p. 163). Similarly, firms make discrete changes to their capital structures by issuing/retiring debt and issuing/repurchasing equity. Thus, the model that I use in this study faces the limitation that Maddala mentions. Using simulated data, Flannery and Rangan (2006) explore the consequences of sporadic adjustments on the coefficients that result from estimating a smooth partial-adjustment model and find that the resulting bias is economically unimportant.
3. I remove from the sample observations with illogical values of Pred_MDR greater than 1 or less than 0.
4. Because firms' marginal tax rates and leverage ratios share an endogenous relationship, I use one-year lagging marginal tax rates based on income *after* interest expense has been deducted to calculate High_Tax. Alternatively, based on Graham, Lemmon, and Schallheim (1998), I use contemporaneous marginal tax rates based on income *before* interest expense has been deducted to classify firms as high- or low-tax. The regression results in Tables III-5 and III-6 are qualitatively

unaltered by this modification.

5. A large number of sample firms possess marginal tax rates equal to the sample median value. Rather than arbitrarily assign these firms to the high- or low-tax sub-sample, I delete firms with MTRs between the first and third quartile values. This decision reduces my sample size but provides a cleaner test of the impact of tax status on speed of adjustment.

6. The sample period in Flannery and Rangan (2006) begins in 1965 rather than 1980. However, simulated marginal tax rate data are not readily available for years prior to 1980.

7. The Tax Reform Act of 1986 (TRA86), the last significant restructuring of the Internal Revenue Code, occurred during my sample period. I attempt to conduct sub-period analyses to determine if this change in tax law impacts my results. However, I lack sufficient observations with complete data in the pre-TRA86 period (97 firm-year observations from years 1980 to 1986) to estimate Model (III-1) and test my hypotheses. The results of estimating Model (III-1) during the post-TRA86 sub-period (3,639 firm-year observations from years 1987 to 2001) are qualitatively unaltered from those reported in Tables 2 through 6 for the entire sample period, implying that pooling the pre- and post-TRA86 sub-samples is acceptable.

8. When I estimate this model without firm and year fixed effects, this R2 statistic falls to 63.20 percent.

9. I also estimate Model (III-1) using firm-year observations with MTR measures

between the bottom quartile (25th percentile) and top quartile (75th percentile) values (that is, observations that I classify as neither high- nor low-tax and thus delete from my sample). In untabulated results, I find λ values of approximately 49 percent and 51 percent for the sub-samples of observations with actual leverage ratios below and above their targets, respectively. As expected, these adjustment speeds are slower than those of the high-tax observations below their optimal debt levels and the low-tax observations above their target capital structures.

10. In sensitivity testing, I re-define Debt_Ch as the difference in firms' total debt levels (the sum of long-term debt and debt in current liabilities) between the current year and the previous year. Similarly, I re-define Equity_Ch as the year-to-year change in firms' common stock levels. Neither of these changes qualitatively alters the coefficient estimates in Table III-7.

11. My methodology for classifying firms as debt or equity adjusters differs from that of Hovakimian et al. (2001) in two ways. First, those authors require sample firms' changes in debt or equity to exceed five percent of total assets to qualify as debt and equity adjusters, whereas I use a one-percent benchmark. Second, the prior study omits from the sample all firms that adjust both debt and equity during a single year, whereas I retain these firms in my sample. Precisely mimicking the methodology from Hovakimian et al. (2001) decreases my sample size to a level that precludes estimation of necessary fixed-effects models. These two deviations contribute noise that biases against finding my expected results. Thus, discovering support for my predictions despite this noise bolsters the reliability of my results.

CHAPTER IV

MANAGING EARNINGS BY MANIPULATING PRODUCTION: COORDINATING TAX AND FINANCIAL REPORTING INCENTIVES

Introduction

Firms that meet or beat their quarterly consensus analyst forecasts enjoy higher returns than companies that miss these income goals (Bartov, Givoly, and Hahn 2002). Thus, firms that would otherwise fall short of these benchmarks face incentives to manage their book income upward. Companies also face incentives to improve their cash flows by reducing their taxable income and associated tax liabilities. Because book and tax income numbers are positively correlated, firms must coordinate these opposing incentives when making business decisions that affect profits. Numerous studies have investigated this tradeoff, and a survey of this literature reveals that neither tax nor financial reporting considerations consistently dominate the other factor. Thus, additional research is merited.

In this chapter, I examine an earnings management strategy that is unique to manufacturing firms. Specifically, companies that miss their earnings benchmarks can produce inventory in excess of sales, thereby shifting fixed manufacturing costs from cost of goods sold (COGS) to inventory accounts, increasing income, and potentially reaching their earnings targets. In contrast, firms that beat their income goals can underproduce relative to sales, transferring fixed costs from asset to expense accounts, reducing profits, and building "cookie jar" reserves for use in future periods. I also investigate two tax management strategies. First, as firms' marginal tax rates (MTRs) rise, they incur larger tax liabilities as their taxable income increases (or enjoy greater tax savings as their taxable income falls). Thus, high-tax companies have a greater incentive to reduce their taxable earnings than low-tax firms possess. Second, firms face motivations to lower taxable income in the fourth quarter, relative to the first three quarters of the year, for purposes of minimizing the current year's tax liability (or maximizing the refund) and the subsequent year's estimated tax payments.

The purpose of this chapter is to extend the tax and financial reporting tradeoff literature by studying how taxes influence manufacturing companies' production decisions in the presence of financial reporting incentives. For firms that exceed their earnings benchmarks absent production manipulation, book and tax incentives align; thus, I predict that these companies make discretionary inventory decreases and that these cuts to production are larger as MTRs rise and in the fourth quarter relative to the first three quarters. I find results consistent with these hypotheses.

For firms that miss their income targets without modifying inventory, book and tax incentives are opposed; therefore, I expect that these companies make discretionary inventory increases but that these increases are smaller as MTRs climb and in the fourth quarter compared to the previous three quarters. The sub-sample of firms that miss their earnings goals provides an opportunity to study whether tax or financial reporting considerations dominate in this setting. I discover that these companies accelerate production (relative to sales) to improve their book income and potentially reach their consensus analyst forecasts. I also find that higher MTRs do not prevent these firms from augmenting inventory to increase income, but tax timing considerations attenuate this earnings management strategy in the fourth quarter.

The remainder of this chapter proceeds as follows. In the next section, I review three streams of literature relevant to my research topic. Then, I formalize my hypotheses and detail the data and two-stage regression methodology that I use to test them. In the subsequent section, I provide the results of these tests. Finally, I conclude and outline future research opportunities in this area.

Literature Review

Effective tax planning and tax minimization are not synonymous (Scholes et al. 2005). Given the positive correlation between income for tax and financial reporting purposes, strategies that minimize taxes may lead to reductions in book earnings and associated declines in firm value.[1] Thus, firms must weigh the financial reporting costs against the tax benefits of prospective business decisions. Many studies have examined this tradeoff.[2] Some researchers discover that tax factors eclipse financial reporting considerations. For example, Manzon (1992) finds that, to minimize the cost of the alternative minimum tax (AMT), firms facing high MTRs engaged in downward earnings management to a greater extent than companies with low MTRs, and this result is robust to the inclusion of controls for financial reporting incentives. Guenther, Maydew, and Nutter (1997) report that, in response to mandatory adoption of the accrual basis for taxable income determination, former cash-basis taxpayers deferred book income to preserve tax savings.

Other studies provide evidence that financial reporting concerns dominate tax savings. For instance, Maydew, Schipper, and Vincent (1999) show that, in structuring divestitures of assets as either taxable sales or tax-free spin-offs, companies willingly incur taxes to increase book income and cash flows. Erickson, Hanlon, and Maydew (2004) demonstrate that their sample of restatement firms reported overstated book income, included these inflated profits on their tax returns, and thus overpaid their taxes to preserve financial reporting benefits.

Other papers establish that tax and financial reporting factors jointly impact firms' business decisions. Francis and Reiter (1987) find that (1) firms with high MTRs reduce their tax liabilities by overfunding their pension plans and deducting these plan contributions and (2) companies with restrictive debt covenants reduce book expenses by underfunding their pension plans and thus avoiding technical default. Guenther (1994) reports that the corporate tax rate reduction included in the Tax Reform Act of 1986 (TRA1986) motivated firms to defer income to lower-tax years, but firms facing higher financial reporting costs (proxied by the ratio of long-term debt to total assets) deferred less income. Maydew (1997) also uses TRA86 as a natural experimental setting and provides evidence that (1) firms with net operating loss (NOL) carrybacks deferred income and accelerated expenses to enlarge tax refunds in high-tax years and (2) this intertemporal income shifting was increasing in the associated tax benefits and decreasing in the related financial reporting costs.

Overall, the extant literature examining tax and financial reporting tradeoffs reveals that both factors impact firms' business decisions and that neither incentive consistently prevails. Thus, additional research in alternative settings is warranted.

Firms coordinate financial reporting and tax considerations in their inventory accounting decisions.[3] With respect to the last-in, first-out (LIFO) inventory valuation method, studies have investigated firms' decisions to adopt LIFO (Biddle 1980, Morse and Richardson 1983, Lee and Hsieh 1985, Dopuch and Pincus 1988, Lee and Petruzzi 1989, and Cushing and LeClere 1992) and companies' choices to abandon this method (Morse and Richardson 1983, Johnson and Dhaliwal 1988, and Sweeney 1994). These papers consistently report that tax savings play a significant role in firms' selections of inventory valuation methods.

Prior research also has investigated the factors underlying firms' decisions to liquidate and replenish LIFO inventory layers. Cohen and Halperin (1980) and Biddle and Martin (1985) develop analytical models that predict LIFO firms' intra-year purchase/production decisions and end-of-year inventory levels. Davis, Kahn, and Rozen (1984), Cottell (1986), and Dhaliwal, Frankel, and Trezevant (1994) demonstrate that tax costs discourage LIFO liquidations, financial reporting benefits encourage LIFO liquidations, and both the likelihood and size of LIFO liquidations by low-tax firms exceed those for high-tax companies. Bowen and Pfeiffer (1989) and Frankel and Trezevant (1994) examine firms' choices to replace liquidated LIFO layers and discover that tax costs associated with LIFO liquidations stimulate companies to purchase/produce additional inventory at yearend, despite the negative financial reporting consequences of this action. Hunt, Moyer, and Shevlin (1996) employ a simultaneous equations methodology to determine if LIFO firms adjust discretionary accounts (inventory, other current accruals, and depreciation expense) to reach corporate goals (smooth income, reduce debt-related costs, and minimize taxes); their results indicate that LIFO firms sacrifice tax benefits to achieve the other two objectives.

None of the studies cited previously acknowledges that LIFO firms engaging in manufacturing enjoy another earnings management option in addition to LIFO layer liquidations and replacements. Generally Accepted Accounting Principles (GAAP) mandate that manufacturing firms use absorption costing to value their inventories for financial reporting purposes. Under absorption costing, fixed manufacturing costs (such as depreciation expense related to manufacturing facilities and equipment) attach to products. These fixed manufacturing costs reside in inventory until firms sell their products, at which point these costs flow to COGS. Thus, holding sales constant, as manufacturing firms increase production, the amount of fixed costs included in inventory rises, the amount included in COGS falls, and, consequently, income increases. This technique also functions in reverse: as production slows, the value of inventory falls, COGS rises, and earnings decline. Accordingly, manufacturing firms can manage their earnings by manipulating their production. Cook, Huston, and Kinney (2007) refer to this strategy as the “production lever” and demonstrate that LIFO firms that engage in manufacturing face friction in the use of production to manage their earnings because the production lever requires inventory increases to boost earnings, whereas LIFO liquidations necessitate inventory decreases to enhance income. With the exception of Cook et al. (2007), the extant LIFO literature neither acknowledges the production lever effect nor examines this friction by segregating manufacturing firms from the remainder of the LIFO sample.

In this chapter, I exclude LIFO firms from my sample for three reasons. First, in 2005 (the most recent year in my sample period), the Compustat universe includes only 66 firms that use LIFO as their exclusive inventory valuation method (data59=2); of these 66 companies, 41 engage in manufacturing (2000<=dnum<4000). In contrast, 2,037 firms apply the first-in, first-out (FIFO) method (data59=1) in 2005, and 1,357 of these companies report manufacturing SIC codes. Thus, LIFO firms constitute a small percentage of my potential sample of manufacturing firms. Second, as I noted in the previous paragraph, LIFO firms face a tradeoff between overproduction and the liquidation of LIFO layers in managing their earnings upward; this friction does not affect FIFO firms. Third, for LIFO firms, examining the impact of tax and financial reporting incentives on production decisions requires quarterly LIFO reserve data because a change in the LIFO reserve leads to a corresponding change in COGS. Because LIFO reserve data are not readily available on a quarterly basis, I remove these companies from my sample.

Graham, Harvey, and Rajgopal (2005) survey more than 400 financial executives, question whether these managers would engage in actions with real economic consequences (hereafter, real activities management) to meet earnings benchmarks, and report results consistent with this behavior. For example, 79.9 percent of respondents either agreed or strongly agreed that they would decrease discretionary spending on items such as research and development (R&D) or advertising to hit earnings targets. One form of real activities management that researchers have empirically investigated is overproduction. As explained previously, manufacturing firms can manipulate production to manage earnings upward or downward by shifting fixed production costs to inventory accounts or to COGS, respectively. Jiambalvo, Noreen, and Shevlin (1997) investigate the relation between security returns and the earnings component generated by overproduction and find that (1) the market generally views overproduction as “good news” (that is, a leading indicator of strong future performance) but (2) the market discounts this good news for firms that overproduce to smooth earnings. Thomas and Zhang (2002) also proffer earnings management as an explanation for their observed negative correlation between current inventory changes and future returns.

More recent studies have directly investigated the use of production manipulation to manage earnings. Roychowdhury (2006) finds that manufacturing firms report higher unexpected production costs than companies in other industries during years in which earnings management is suspected (that is, years in which income narrowly exceeds target levels). In their studies investigating how firms coordinate various earnings management techniques (within-GAAP versus non-GAAP, accrual manipulation versus real activities management), Badertscher (2007) and Zang (2006) also provide evidence that firms overproduce inventory to lower COGS and augment reported earnings. Cook et al. (2007) document that (1) a systematic association exists between firms’ inventory changes and their financial reporting incentives and (2) this association varies with the proportions of fixed manufacturing costs in these companies’ cost structures and their choices of inventory valuation methods. These studies largely ignore the impact of taxes on firms’ willingness to manage their financial earnings by manipulating production.

The purpose of this chapter is to extend the tax and financial reporting tradeoff literature by examining how taxes impact manufacturing firms' production decisions in the presence of financial reporting incentives.

Motivation and Hypotheses

Manufacturing firms with earnings above their target levels ("beat firms") may use discretionary inventory decreases to reduce their income and build "cookie jar" reserves.[4] In contrast, manufacturing firms with earnings below their target levels ("miss firms") may use discretionary inventory increases to boost their income and potentially reach their goals. Hypotheses 1A and 1B formalize these expectations:[5, 6]

H1A: Beat firms make discretionary inventory decreases to lower reported financial earnings.

H1B: Miss firms make discretionary inventory increases to raise reported financial earnings.

Firms managing book income downward by decelerating production (relative to sales) receive a tax benefit from this strategy by simultaneously decreasing their taxable income. For these companies, no tradeoff exists between tax and financial reporting factors; rather, these incentives align. In contrast, one cost of managing income upward by accelerating production (relative to sales) is the tax liability that the Internal Revenue Service (IRS) levies on these additional profits. Thus, as their tax burdens increase, manufacturing firms that miss their income goals absent overproduction may limit their use of this earnings enhancement strategy. These companies must weigh the tax cost and financial reporting benefit (that is, the possibility of reaching their earnings targets) of this technique, and which consideration dominates in this scenario is ripe for empirical investigation. Since discretionary production decisions affect firms' earnings at the margin, I use MTRs to proxy for the tax costs and benefits associated with under- or overproduction. Hypotheses 2A, 2B, and 2C express my predictions (presuming that taxes impact this business decision):

H2A: Beat firms make larger discretionary inventory decreases as their MTRs increase.

H2B: Relative to beat firms, the influence of MTRs on miss firms' discretionary production decisions is muted.

H2C: Miss firms make smaller discretionary inventory increases as their MTRs increase.

Tax considerations may also impact the timing of firms' production decisions. Specifically, companies face incentives to reduce taxable income in the fourth quarter, relative to the first three quarters of the year, for purposes of determining the current year's tax liability (or refund) and the subsequent year's estimated tax payments. With respect to the current year's tax burden, firms that have overproduced (relative to sales) to hit their earnings targets in the first three quarters of the year may limit or reverse this strategy in the fourth quarter in anticipation of filing IRS Form 1120, thereby reducing the liability (or increasing the refund) reported on these tax returns. With respect to the subsequent year's estimated tax payments, companies that meet four criteria (prior tax year was 12 months, filed a tax return in the prior year, did not report a tax liability in the prior year, and had less than $1 million of taxable income in each of the prior three years) do not incur underpayment penalties in the subsequent year if the sum of their estimated tax payments in that year equal or exceed their total tax in the current year. For firms that fail to meet these conditions, the IRS will not assess underpayment penalties if the sum of estimated tax payments in the current year equals or exceeds that year's total tax. Under either scenario, corporations face stronger incentives in the fourth quarter to reduce their taxable income than they confront in the first three quarters.[7] For firms that exceed their income goals without manipulating production, this tax timing incentive suggests more downward earnings management in the fourth quarter. However, for firms that miss their earnings targets absent discretionary income changes, this tax motivation implies less upward earnings management in the fourth quarter. Again, for miss firms, determining whether tax timing concerns overshadow financial reporting considerations in this setting is an empirical question. Hypotheses 3A, 3B, and 3C articulate my expectations (assuming that taxes matter):

H3A: Beat firms make larger discretionary inventory decreases in the fourth quarter relative to the first three quarters.

H3B: Relative to beat firms, the influence of tax timing on miss firms' discretionary production decisions is muted.

H3C: Miss firms make smaller discretionary inventory increases in the fourth quarter relative to the first three quarters.

Data and Methodology

My initial sample contains 934,489 firm-quarter observations from the Compustat Industrial Quarterly database for the years 1988 through 2005. I begin my sample period in 1988, following the last significant restructuring of the Internal

Revenue Code (TRA86), so that the tax structure is relatively stable during the sample period.[8] To explore the manipulation of production to manage earnings, I limit my sample to manufacturing firms; thus, I eliminate 607,734 observations for non-manufacturing companies with Standard Industrial Classification (SIC) codes less than 2000 or greater than 3999. I remove 280,487 observations that lack required quarterly financial statement data from Compustat and 26,257 observations that report no inventories, fail to report inventory valuation methods, or use methods other than FIFO to value their inventories.[9] I eliminate non-FIFO firms because I cannot anticipate how alternate inventory valuation methods, such as specific identification and average cost, impact companies' incentives to manage earnings through discretionary inventory changes. I also discard 6,437 observations that lack MTR data from John Graham's website (http://faculty.fuqua.duke.edu/~jgraham/) and 7,258 observations that lack forecasted and actual earnings data from I/B/E/S. These cuts yield a final sample of 6,316 firm-quarter observations representing 758 unique firms. The mean and median quarters of data per firm are 8.33 and 5, respectively. Table IV-1 presents the sample screening process that I use to determine this final sample size.

To test my hypotheses, I use a two-stage regression procedure. In the first stage, I develop Model (IV-1) to purge firms' total quarterly inventory changes of the non-discretionary component associated with current sales, future demand, and firm- and year-specific factors. The residuals from this model represent firms' quarterly discretionary inventory changes, which I presume relate in part to tax and financial reporting incentives. I provide Compustat quarterly variable numbers in parentheses:

Table IV-1: Chapter IV Sample Size Derivation

Initial firm-quarter observations from the Compustat Industrial Quarterly database for years 1988-2005	934,489
Less:	
Non-manufacturing firm-quarter observations (dnum<2000 or dnum>=4000)	(607,734)
Firm-quarter observations that lack inventory, fail to report an inventory valuation method, or use a non-FIFO method (data59^=1)	(26,257)
Firm-quarter observations that lack sufficient data from the following databases to calculate required variables:	
Compustat Industrial Quarterly	(280,487)
John Graham's marginal tax rate website	(6,437)
Institutional Brokers' Estimate System (I/B/E/S)	(7,258)
Final sample size	6,316

$$Inv\_ch_{i,q} = \alpha + \beta_1 Sal\_ch_{i,q} + \beta_2 Fut\_dem_{i,q+1} + \beta_3 Fut\_dem_{i,q+2} + \beta_4 Fut\_dem_{i,q+3} + \beta_{5\text{-}761} \text{ Firm Indicators}_i + \beta_{762\text{-}777} \text{ Year Indicators}_y + \varepsilon_{i,q}, \text{ where} \quad \text{(IV-1)}$$

$Inv\_ch_{i,q}$ = $inventories_{i,q}$ (data38) – $inventories_{i,q-1}$

$Sal\_ch_{i,q}$ = $sales_{i,q}$ (data2) – $sales_{i,q-1}$

$Fut\_dem_{i,q+1}$ = $sales_{i,q+1} - sales_{i,q}$

$Fut\_dem_{i,q+2}$ = $sales_{i,q+2} - sales_{i,q+1}$

$Fut\_dem_{i,q+3}$ = $sales_{i,q+3} - sales_{i,q+2}$

The response variable, *Inv_ch*, measures sample firms' total inventory changes during the current quarter. *Sal_ch* captures sales changes occurring contemporaneously with *Inv_ch*, and *Fut_dem* represents sales changes occurring in the three subsequent quarters (proxies for managers' expectations of future demand for their firms' products). If companies strive to maintain a constant ratio of inventory to sales in order to avoid excess carrying costs and stock outages, a positive relation should exist between *Inv_ch* and *Sal_ch*. However, if increases in sales draw down inventory (or decreases in sales build up inventory) without offsetting adjustments to production, a negative association should manifest between *Inv_ch* and *Sal_ch*. Thus, I place no directional prediction on this variable. In contrast, assuming that firms modify their production in anticipation of future changes in demand, I expect a direct association between *Inv_ch* and *Fut_dem*. I include in Model (IV-1) proxies for future demand in the next three quarters because companies' production decisions in the current quarter may relate to anticipated sales over various time horizons. For example, a calendar-year toy manufacturer may produce dolls during the first quarter in anticipation of holiday sales in the fourth quarter of the same year. A calendar-year automobile manufacturer may build cars in the fourth quarter in anticipation of summer sales in the second and third quarters of the following year. I winsorize the continuous variables in Model (IV-1) at the 1st and 99th percentiles to reduce the influence of outlying observations and employ a two-way fixed effects approach that controls for firm- and year-specific factors that influence firms' inventory changes but may not relate to tax or financial reporting considerations.[10] I label the residuals from this estimation *Disc_inv_ch*, a measure of firms' discretionary inventory changes. Table IV-2 provides definitions of all variables that I use in this chapter.

For a firm that uses the FIFO inventory valuation method, the following equation captures the earnings effect of a discretionary inventory change:

$Earn\_eff_{i,q}$ = $Disc\_inv\_ch_{i,q} \bullet FCR_{i,q}$, where

$Disc\_inv\_ch_{i,q}$ = the residual from Model (IV-1)

$FCR_{i,q}$ = property, plant, and equipment$_{i,q}$ (data42) / assets$_{i,q}$

This equation demonstrates that, as a FIFO firm alters its level of production (for a constant level of sales), a corresponding change in income occurs. As Cook et al. (2007) demonstrate, the potency of this earnings management strategy depends on the firm's cost structure. As the proportion of fixed manufacturing costs in the firm's cost structure (the fixed-cost ratio, *FCR*) increases, the earnings effect of a discretionary inventory change also increases.

In the second stage, I construct Model (IV-2) to evaluate whether and to what extent tax and financial reporting considerations influence the earnings effects of firms'

Table IV-2. Chapter IV Variable Definitions

$Inv\_ch_{i,q}$	total inventory change: inventories$_{i,q}$ (data38) - inventories$_{i,q-1}$
$Sal\_ch_{i,q}$	sales change: sales$_{i,q}$ (data2) - sales$_{i,q-1}$
$Fut\_dem_{i,q+1}$	future demand one quarter ahead: sales$_{i,q+1}$ - sales$_{i,q}$
$Fut\_dem_{i,q+2}$	future demand two quarters ahead: sales$_{i,q+2}$ - sales$_{i,q+1}$
$Fut\_dem_{i,q+3}$	future demand three quarters ahead: sales$_{i,q+3}$ - sales$_{i,q+2}$
$Disc\_inv\_ch_{i,q}$	discretionary inventory change: residual from Model (1)
$FCR_{i,q}$	fixed cost ratio: property, plant, and equipment$_{i,q}$ (data42) / assets$_{i,q}$ (data44)
$Earn\_eff_{i,q}$	earnings effect of discretionary inventory change: $Disc\_inv\_ch_{i,q}$ • $FCR_{i,q}$
$Earn\_eff\_ass_{i,q}$	$Earn\_eff_{i,q}$ / assets$_{i,q}$
ETR_{iq}	effective tax rate: income taxes$_{i,q}$ (data6) / pretax income$_{i,q}$ (data23)
$Forecast_{i,q}$	forecasted earnings: the last I/B/E/S consensus forecast estimate$_{i,q}$ (meanest) * common shares used to calculate EPS$_{i,q}$ (data54) / (1 - $ETR_{i,q}$)
$Actual_{i,q}$	actual earnings: I/B/E/S actual EPS$_{i,q}$ (value) * common shares used to calculate EPS$_{i,q}$ / (1 - $ETR_{i,q}$)
$Preman_{i,q}$	pre-managed earnings: $Actual_{i,q}$ - $Earn\_eff_{i,q}$
$Miss_{i,q}$	an indicator variable coded 1 if $Forecast_{i,q}$ exceeds $Preman_{i,q}$, and 0 otherwise
$MTR_{i,y-1}$	lagged marginal tax rate$_{i,y-1}$ based on income after deducting interest expense
$Time_{q}$	an indicator variable coded 1 if quarter$_{q}$ is the fourth quarter of the year, and 0 otherwise
$LR_{i,q-1}$	lagged leverage ratio: liabilities$_{i,q-1}$ (data54) / assets$_{i,q-1}$

discretionary inventory changes:

$Earn\_eff\_ass_{i,q}$ = $\alpha + \beta_1\, Miss_{i,q} + \beta_2\, MTR_{i,y-1} + \beta_3\, Miss_{i,q} \bullet MTR_{i,y-1} + \beta_4\, Time_q + \beta_5\, Miss_{i,q} \bullet Time_q + \beta_6\, LR_{i,q-1} + \beta_7\, Miss_{i,q} \bullet LR_{i,q-1} + \varepsilon_{i,q}$, where (IV-2)

$Earn\_eff\_ass_{i,q}$ = $Earn\_eff_{i,q}$ / $assets_{i,q}$

$Miss_{i,q}$ = an indicator variable coded 1 if firm i misses its income target in quarter q absent the earnings effect of its discretionary inventory change, and 0 otherwise

$MTR_{i,y-1}$ = lagged marginal tax $rate_{i,y-1}$ based on earnings after deducting interest expense

$Time_q$ = an indicator variable coded 1 if quarter q is the fourth quarter of the year, and 0 otherwise

$LR_{i,q-1}$ = $liabilities_{i,q-1}$ (data54) / $assets_{i,q-1}$ (data44)

The response variable, *Earn_eff_ass*, measures the earnings effect of sample firms' discretionary inventory changes, scaled by total assets to control for firm size.[11] The indicator variable *Miss* captures firms' financial reporting incentives. Appendix B details the calculation of *Miss*. This variable assumes that companies with premanaged earnings (that is, actual earnings less the earnings effect of discretionary inventory changes) that fail to reach their consensus analyst forecasts possess an incentive to boost their income. Graham et al. (2005) report that 73.5 percent of executives in their survey list the consensus analyst forecast as an important earnings benchmark. Brown and Caylor (2005) find that, over time, stockholders value companies' abilities to meet or beat their consensus analyst forecasts more than they reward these firms for avoiding losses and negative quarterly earnings surprises. Matsunaga and Park (2001) also discover that missing consensus analyst forecasts negatively impacts CEOs' annual bonuses. In keeping with H1A, I expect a negative coefficient for the intercept (α), indicating that beat firms decrease production, thereby decreasing their reported financial earnings and creating "cookie jar" reserves. Consistent with H1B, I predict a positive sum of the intercept and the coefficient for the *Miss* main effect ($\alpha+\beta_1$), implying that miss firms increase production, thereby raising their reported financial earnings and potentially reaching their income goals.

The continuous variable *MTR* captures firms' tax incentives related to tax rates. Since the earnings effects of firms' discretionary inventory changes indirectly influence their MTRs by modifying their taxable income, an endogenous relationship exists between contemporaneous measures of *Earn_eff_ass* and *MTR*; thus, I use one-year lagged values of *MTR* in Model (IV-2).[12] In keeping with H2A, I expect a negative coefficient for the *MTR* main effect (β_2), indicating that beat firms make larger discretionary inventory decreases as their MTRs rise. As H2B predicts, I anticipate a positive coefficient for the interaction of *Miss* with *MTR* (β_3) because, unlike beat firms, miss firms face friction between their tax rate and financial reporting incentives. Consistent with H2C, I predict a negative sum of the coefficients for *MTR* and the interaction of *Miss* with *MTR* ($\beta_2+\beta_3$), implying that miss firms make smaller discretionary inventory increases as their MTRs rise. However, if the sum of β_2 and β_3 does not differ significantly from zero, this result provides evidence that higher tax rates do not deter miss firms from overproducing to increase their book income.

The indicator variable *Time* captures firms' tax incentives associated with tax timing.[13] In keeping with H3A, I expect a negative coefficient for the *Time* main effect (β_4), indicating that beat firms make larger discretionary inventory decreases in the fourth quarter relative to the first three quarters. As H3B predicts, I anticipate a positive coefficient for the interaction of *Miss* with *Time* (β_5) because miss firms possess financial reporting considerations that diminish the benefit of tax timing whereas these motivations ally for beat companies. Consistent with H3C, I predict a negative sum of the coefficients for *Time* and the interaction of *Miss* with *Time* (β_4+β_5), implying that miss firms make smaller discretionary inventory increases in the fourth quarter relative to the first three quarters. Again, if the sum of β_4 and β_5 does not differ significantly from zero, this finding indicates that the incentives to minimize the current year's tax liability (or maximize the refund), avoid an underpayment penalty, and minimize the subsequent year's estimated tax payments do not overwhelm the desire to improve earnings in the fourth quarter.

LR measures firms' ratios of total liabilities to total assets. If companies assume debt to finance their purchases of materials used to generate additional inventory, the balance-sheet ratios that lenders specify in debt covenants likely worsen. Thus, I include *LR* as a control variable and anticipate a negative correlation between this variable and *Earn_eff_ass*, implying that leverage constraints encourage underproduction. I also interact *Miss* with *LR* because the enticement of reaching or exceeding their earnings targets may differentially impact the relation between debt covenants and production decisions for miss firms relative to beat companies. Since firms' discretionary inventory changes directly impact both the numerator and denominator of their leverage ratios, an endogenous relationship exists between contemporaneous measures of *Earn_eff_ass* and *LR*; thus, I use one-quarter lagged values of *LR* in Model (IV-2). As in Model (IV-1), I winsorize the continuous variables in Model (IV-2) at the 1st and 99th percentiles to limit the impact of outliers.[14]

Results

Table IV-3, Panels A, B, and C present descriptive statistics, correlation coefficients, and regression coefficients related to Model (IV-1). In Panel B, the correlation between *Inv_ch* and *Sal_ch* is negative and significant, indicating that firms allow their inventories to shrink as sales increase (and swell as sales decrease) rather than sustaining a stable ratio between these variables. The strongest association in this panel exists between *Inv_ch* and one-quarter-ahead *Fut_dem*, implying that companies' inventory levels in the current quarter are primarily influenced by anticipated demand in the near term. However, the correlation between *Inv_ch* and three-quarter-ahead *Fut_dem* is also positive and significant, implying that longer-term product demand also affects managers' current production decisions.

In Panel C, I report the results of estimating Model (IV-1). The coefficient on *Sal_ch* is insignificant. However, the coefficients on *Fut_dem* in each of the subsequent three quarters are positive and significant, suggesting that inventory levels in the current quarter reflect managers' expectations of customers' demand for their products in the next three quarters. The condition index for Model (IV-1) is 1.51; thus, multicollinearity

Table IV-3. Descriptive Statistics, Correlation Coefficients, and Regression Coefficients for Model (IV-1)

Panel A. Descriptive Statistics

Variable	N	Mean	Std. Dev.	Minimum	Q1	Median	Q3	Maximum
$Inv\_ch_{i,q}$	6,316	2.2146	15.7600	-58.2740	-0.8025	0.5695	3.2965	84.9290
$Sal\_ch_{i,q}$	6,316	8.3183	55.5271	-208.7890	-1.1725	1.5500	7.6680	313.2999
$Fut\_dem_{i,q+1}$	6,316	9.3799	55.0077	-177.9680	-1.2235	1.6155	8.1755	317.8389
$Fut\_dem_{i,q+2}$	6,316	10.1140	57.7650	-178.9780	-1.3020	1.6790	8.5810	336.1510
$Fut\_dem_{i,q+3}$	6,316	9.6360	60.1764	-197.2300	-1.6175	1.5989	8.5940	341.2049

I winsorize all variables at the 1st and 99th percentiles.

Table IV-3. Continued

Panel B. Correlation Coefficients with $Inv\_ch_{i,q}$

Variable	Prediction	Correlation Coefficient	
$Sal\_ch_{i,q}$	?	-0.0697	***
$Fut\_dem_{i,q+1}$	+	0.4162	***
$Fut\_dem_{i,q+2}$	+	0.0082	
$Fut\_dem_{i,q+3}$	+	0.0554	***

*** The correlation coefficient is significant at the 0.01 level.

Table IV-3. Continued

Model (IV-1): $Inv\_ch_{i,q} = \alpha + \beta_1\ Sal\_ch_{i,q} + \beta_2\ Fut\_dem_{i,q+1} + \beta_3\ Fut\_dem_{i,q+2} +$

$\beta_4\ Fut\_dem_{i,q+3} + \beta_{5\text{-}761}$ Firm $Indicators_i$ +

$\beta_{762\text{-}777}$ Year $Indicators_y + \varepsilon_{i,q}$

Panel C. Regression Coefficients

Variable	Prediction	Regression Coefficient	
Intercept	?	6.1222	
$Sal\_ch_{i,q}$	?	0.0029	
$Fut\_dem_{i,q+1}$	+	0.1160	***
$Fut\_dem_{i,q+2}$	+	0.0130	***
$Fut\_dem_{i,q+3}$	+	0.0097	***
Observations	6,316		
Condition Index	1.51		
R^2	26.84%		

*** The regression coefficient is significant at the 0.01 level.

I estimate these regression coefficients using a two-way fixed effects model.

I omit firm and year indicator variables from the table for concision.

does not appear to impact these regression results. The R^2 statistic for Model (IV-1) is 26.84 percent, meaning that the independent variables in the model explain more than a quarter of the variation in *Inv_ch*. An F test (untabulated) also reveals that the firm and year indicator variables contribute significant explanatory power to the model.

Table IV-4, Panels A, B, and C present descriptive statistics, correlation coefficients, and regression coefficients related to Model (IV-2). Given that my expectations differ depending on whether firms miss or beat their quarterly earnings benchmarks, I partition Panels A and B according to the indicator variable *Miss* and display separate results for each sub-sample of firm-quarter observations. For my sample, 4,168 observations (65.99 percent) report pre-managed earnings equal to or in excess of their consensus analyst forecasts, and 2,148 observations (34.01 percent) fail to reach their income targets absent discretionary inventory changes. In Panel A, both the mean and median values for *Earn_eff_ass* are negative for beat firms (*Miss*=0) and positive for miss firms (*Miss*=1). These statistics provide univariate support for H1A and H1B; on average, manufacturing firms that exceed their quarterly income targets absent discretionary inventory changes cut production (relative to sales) and lower their reported financial earnings, while companies that miss their income goals without manipulating production add to their inventories and boost their profits.

In Panel B, the correlations between *Earn_eff_ass* and both *MTR* and *Time* are negative and significant for the beat sub-sample, providing initial support for H2A and H3A. That is, beat firms appear to make larger discretionary inventory decreases as (1) their MTRs increase and (2) in the fourth quarter relative to the first three quarters. For

Table IV-4. Descriptive Statistics, Correlation Coefficients, and Regression Coefficients for Model (IV-2)

Panel A. Descriptive Statistics

$Miss_{i,q}$=0

Variable	N	Mean	Std. Dev.	Minimum	Q1	Median	Q3	Maximum
$Earn\_eff\_ass_{i,q}$	4,168	-0.0023	0.0051	-0.0229	-0.0035	-0.0009	0.0002	0.0148
$MTR_{i,y-1}$	4,168	0.2735	0.1330	0.0000	0.2900	0.3400	0.3500	0.3802
$Time_q$	4,168	0.2687	0.4433	0	0	0	1	1
$LR_{i,q-1}$	4,168	0.3823	0.1995	0.0591	0.2158	0.3618	0.5219	0.9523

$Miss_{i,q}$=1

Variable	N	Mean	Std. Dev.	Minimum	Q1	Median	Q3	Maximum
$Earn\_eff\_ass_{i,q}$	2,148	0.0024	0.0044	-0.0229	0.0001	0.0015	0.0042	0.0148
$MTR_{i,y-1}$	2,148	0.2852	0.1247	0.0000	0.3249	0.3400	0.3500	0.3802
$Time_q$	2,148	0.2118	0.4087	0	0	0	0	1
$LR_{i,q-1}$	2,148	0.3691	0.1941	0.0591	0.2130	0.3467	0.5000	0.9523

I winsorize all continuous variables at the 1^{st} and 99^{th} percentiles.

Table IV-4. Continued

Panel B. Correlation Coefficients with $Earn\_eff\_ass_{i,q}$

$Miss_{i,q}$=0

Variable	Prediction	Correlation Coefficient	
$MTR_{i,y-1}$	-	-0.0658	***
$Time_{q}$	-	-0.0940	***
$LR_{i,q-1}$	-	-0.0567	***

$Miss_{i,q}$=1

Variable	Prediction	Correlation Coefficient	
$MTR_{i,y-1}$	-	0.0089	
$Time_{q}$	-	-0.0421	**
$LR_{i,q-1}$	-	0.0005	

*** The correlation coefficient is significant at the 0.01 level.

** The correlation coefficient is significant at the 0.05 level.

Table IV-4. Continued

Model (IV-2): $Earn\_eff\_ass_{i,q} = \alpha + \beta_1 Miss_{i,q} + \beta_2 MTR_{i,y-1} + \beta_3 Miss_{i,q} \bullet MTR_{i,y-1} +$

$$\beta_4 Time_q + \beta_5 Miss_{i,q} \bullet Time_q + \beta_6 LR_{i,q-1} + \beta_7 Miss_{i,q} \bullet LR_{i,q-1} + \varepsilon_{i,q}$$

Panel C. Regression Coefficients

Variable	Prediction	Regression Coefficient	
Intercept	-	-0.00062	***
$Miss_{i,q}$	+	0.00307	***
$MTR_{i,y-1}$	-	-0.00279	***
$Miss_{i,q} \bullet MTR_{i,y-1}$	+	0.00311	***
$Time_q$	-	-0.00107	***
$Miss_{i,q} \bullet Time_q$	+	0.00061	**
$LR_{i,q-1}$	-	-0.00160	***
$Miss_{i,q} \bullet LR_{i,q-1}$	+	0.00158	***

Observations	6,316
Condition Index	13.27
R^2	18.30%

Tests for Sums of Regression Coefficients

Variables	Prediction	Sum of Coefficients	
Intercept + $Miss_{i,q}$	+	0.00245	***
$MTR_{i,y-1} + Miss_{i,q} \bullet MTR_{i,y-1}$	-	0.00032	
$Time_q + Miss_{i,q} \bullet Time_q$	-	-0.00046	**
$LR_{i,q-1} + Miss_{i,q} \bullet LR_{i,q-1}$	-	-0.00002	

*** The coefficient or sum of coefficients is significant at the 0.01 level.

** The coefficient or sum of coefficients is significant at the 0.05 level.

miss firms, the association between *Earn_eff_ass* and *MTR* is insignificant, lending no support for H2C; however, the correlation between *Earn_eff_ass* and *Time* is negative and significant, bolstering H3C. Note that the association between *Earn_eff_ass* and *Time* is smaller in magnitude (and statistically weaker) for the miss sub-sample relative to the beat sub-sample. These bivariate correlation coefficients demonstrate that tax and financial reporting incentives align for beat firms but create friction for miss firms.

The regression results in Panel C provide multivariate support for the conclusions drawn from the bivariate correlations in Panel B. Specifically, the negative coefficient for the intercept and the positive sum of the coefficients for the intercept and *Miss* imply that beat firms use inventory decreases to manage their earnings downward and create "cookie jar" reserves, while miss firms manage their earnings upward and potentially hit their income targets; these findings support H1A and H1B. The negative coefficients for *MTR* and *Time* indicate that, for beat firms, tax and financial reporting incentives work in unison, encouraging these companies to underproduce inventory (relative to sales) to reduce both tax and book income; these results bolster H2A and H3A. In contrast, the positive coefficients for the interactions of *Miss* with both *MTR* and *Time* suggest that, for miss firms, tension exists between tax and financial reporting factors and that, relative to beat companies, the negative influences of tax rates and timing on the earnings effects of discretionary inventory changes are suppressed. This evidence substantiates H2B and H3B.

By adding the coefficients on (1) *MTR* and *Miss* • *MTR* and (2) *Time* and *Miss* • *Time*, I test the relative importance of tax and financial reporting incentives for miss firms. The sum of *MTR* and *Miss* • *MTR* is insignificant, implying that, contrary to H2C, higher tax rates (and the associated tax burdens) imposed on the additional income generated by overproducing (relative to sales) do not discourage miss firms from enhancing their income in an effort to reach earnings benchmarks. However, consistent with H3C, the sum of *Time* and *Miss* • *Time* is negative and significant, revealing that miss firms sacrifice book income to lower taxable income in the fourth quarter. The coefficient on the *LR* main effect is negative and significant, suggesting that leverage constraints compel beat firms to cut production, while the sum of the coefficients on *LR* and the interaction of *Miss* and *LR* is insignificant, evidence that potential debt covenant violations do not dissuade miss firms from augmenting their profits through discretionary inventory increases. The condition index of 13.27 for Model (IV-2) indicates that multicollinearity does not severely influence these regression results.

Conclusion and Future Research

This chapter demonstrates that manufacturing firms manipulate production to manage earnings and examines whether tax incentives magnify or temper this strategy. Companies that exceed their quarterly consensus analyst forecasts absent the earnings effects of discretionary inventory changes cut production (relative to sales), creating an earnings "cookie jar" for future quarters. For this sub-sample, tax and financial reporting incentives are aligned; thus, these companies make larger discretionary inventory decreases (1) as their MTRs rise and (2) in the fourth quarter relative to the first three quarters. In contrast, the sub-sample of firms that miss their income goals without manipulating production use discretionary inventory increases to enhance their earnings and potentially reach their benchmarks. For these companies, friction exists between tax and financial reporting incentives. Results indicate that higher tax rates do not impede miss firms from managing their earnings upward; however, tax timing considerations dissuade these companies from opportunistically manipulating production in the fourth quarter.

Future research may investigate (both cross-sectionally and inter-temporally) why some firms respond to tax incentives while others react to financial reporting concerns. For companies that link their managers' compensation plans to accounting income or stock price (via performance-based bonuses or stock options), I predict that maximizing book earnings supersedes minimizing taxable income. On the contrary, for firms with strong corporate governance mechanisms, I expect that earnings management is less prevalent. Legal and regulatory changes may also influence the tradeoff between tax and financial reporting incentives across time. For example, the corporate tax rate reductions included in TRA86 diminished the benefits of minimizing taxes for companies with high taxable income. Similarly, increased scrutiny of financial statements (and harsher penalties for transgressions) following passage of the Sarbanes-Oxley Act of 2002 (SOX) may reduce firms' willingness to manipulate book income.

Notes

1. Kothari (2001) and Holthausen and Watts (2001) provide thorough reviews of the literature examining the relationship between accounting earnings and stock price.
2. Shackelford and Shevlin (2001, 326-338) provide a thorough review of the literature examining the tradeoffs between tax and financial reporting.

3. Jenkins and Pincus (1998) provide a thorough review of the literature examining firms' choices of inventory valuation methods.
4. In this context, the creation of "cookie jar" reserves implies that underproduction relative to demand in the current period permits overproduction relative to demand in a future period, granting the firm the associated earnings improvement in that future period.
5. This strategy involves costs. If a manufacturing firm increases production to boost income, the company incurs carrying costs (storage, insurance, property taxes, etc.) for the unsold units and may suffer inventory obsolescence. In contrast, if a manufacturing firm decreases production to reduce income, the business may experience stock outages and order backlogs (and the associated reputational effects). If firms only engage in this form of earnings management to the extent that the tax and/or financial reporting benefits exceed these costs, the presence of such costs biases against discovering my hypothesized results.
6. I assume that managers realize that their firms' earnings will either beat or miss their income goals with sufficient time to modify production accordingly.
7. The IRS also permits firms that fail to meet the four conditions to base their estimated tax payments on annualized income; that is, they may determine the amount of their quarterly payments according to the taxable income earned through the month before the month in which the payment is due (for example, firms use taxable income earned through May to calculate the estimated tax payment due on June 15). For these companies, the tax costs and benefits of manipulating

production occur uniformly throughout the four quarters. The presence of firms in my sample that use the annualization approach biases against discovering my hypothesized results related to tax timing.

8. TRA86 reduced the top statutory tax rate for corporations from 46 percent in 1986 to 40 percent in 1987 and again to 34 percent in 1988. The Revenue Reconciliation Tax Act of 1993 (RRTA93) raised this rate slightly to 35 percent.

9. For some firms, Compustat reports multiple-digit values for data59, signifying that these companies use more than one method to value their inventories. For these firms, Compustat lists the methods in the order of the relative amount of inventory valued by each method. The reduce noise, I include in my sample only firms with single-digit values for data59.

10. The results of estimating Models (IV-1) and (IV-2) are qualitatively unaltered if I replace firm indicator variables in Model (IV-1) with industry indicator variables based on two-digit SIC codes.

11. The results of estimating Model (IV-2) are qualitatively unaltered if I use *Earn_eff* (unscaled) as the response variable and include the natural logarithm of assets as an explanatory variable to control for firm size.

12. During my sample period, the average change in MTR from one year to the next was less than one percent for the majority of firms in John Graham’s MTR database. Given that MTRs are relatively stable across time, I assume that firms’ actual MTRs in the previous year represent their anticipated MTRs in the current year. Since John Graham provides MTR data on an annual basis, I apply the one-

year lagged *MTR* values to all quarters in the current year.

13. The *Time* variable may capture timing effects unrelated to taxes. For example, since most sample firms have December 31 fiscal yearends, increased sales during the holiday shopping season may draw down inventories, and the associated negative inventory changes during the fourth quarter may engender a timing effect. However, Model (IV-1) purges firms' total inventory changes of the component driven by contemporaneous sales changes. As a sensitivity test, I re-estimate Model (IV-2) for sub-samples of firms with December 31 fiscal yearends (3,529 observations, 55.87 percent) and those with fiscal years ending in other months (2,787 observations, 44.13 percent). The results of these estimations are qualitatively equivalent to those for the pooled sample of 6,316 observations.

14. The results of estimating Model (IV-2) are qualitatively unaltered if I include firm (or industry) and year indicator variables. However, I specifically exclude these explanatory variables from Model (IV-2) because Model (IV-1) theoretically purges these effects from firms' total inventory changes.

CHAPTER V

CONCLUSION

This dissertation contains three essays. In the first essay, descriptive statistics indicate that, during the event week, firms whose stock prices appreciated in the year prior to news of the TRA97 rate cut reaching the market experienced lower returns than companies with depreciated equity values. Returns during the event week were larger for firms with short-term average holding periods than for companies with long-term average holding periods. Firms with individual marginal investors experienced a less-favorable stock price reaction during the event week than firms with institutional marginal investors. Regression results show that firms possessing all three of these characteristics (appreciated stock price, long-term average holding period, and individual marginal investor) earned lower event-week returns than companies lacking one of more of these traits; this response of equity values during the event week is consistent with investors anticipating a lessening of the lock-in effect. Although the overall stock price reaction to the news of the TRA97 tax rate cut was positive, this response was muted for firms with marginal shareholders subject to the new, lower rate (that is, individual stockholders with long-term capital gains). These results are robust to a variety of alternate sample, model, and variable specifications.

In the second essay, I determine whether taxes serve as adjustment costs that influence the speed at which firms converge on their target leverage ratios. Specifically, I hypothesize that, among high-tax firms, companies below their optimal debt levels respond more quickly than companies above these targets because high-tax firms can better utilize the interest deductions generated by issuing additional debt to reduce their tax liabilities. Conversely, I expect that, among low-tax firms, companies above their target capital structures adjust more rapidly than companies below their goals because low-tax firms have less need of interest deductions to decrease their tax burdens and thus sacrifice less tax benefit when retiring debt. To test these predictions, I use the partial-adjustment model from Flannery and Rangan (2006). Using a sample of 3,736 firm-year observations from years 1981-2000, I begin by replicating the model to verify that the explanatory variables impact firms' market debt ratios as prior research has discovered. Then, I employ this methodology to determine if firms' tax statuses (high or low) have a differing impact on the speeds at which they converge on their target leverage ratios depending on whether they are currently above or below these optimal levels. I find that, among low-tax firms, companies with actual debt ratios above their targets adjust more rapidly. This result is consistent with low-tax firms having a greater willingness to retire debt because of an inability to benefit from interest deductions. Among high-tax firms, companies with actual debt ratios below their targets adjust more quickly. This finding indicates that high-tax firms are better able to utilize the interest deductions associated with new debt issues to reduce their tax liabilities.

In the third essay, I extend the tax and financial reporting tradeoff literature by studying how taxes influence manufacturing companies' production decisions in the presence of financial reporting incentives. For firms that exceed their earnings benchmarks absent production manipulation, book and tax incentives align; thus, I predict that these companies make discretionary inventory decreases and that these cuts to production are larger as MTRs rise and in the fourth quarter relative to the first three quarters. I find results consistent with these hypotheses. For firms that miss their income targets without modifying inventory, book and tax incentives are opposed; therefore, I expect that these companies make discretionary inventory increases but that these increases are smaller as MTRs climb and in the fourth quarter compared to the previous three quarters. The sub-sample of firms that miss their earnings goals provides an opportunity to study whether tax or financial reporting considerations dominate in this setting. I discover that these companies accelerate production (relative to sales) to improve their book income and potentially reach their consensus analyst forecasts. I also find that higher MTRs do not prevent these firms from augmenting inventory to increase income, but tax timing considerations attenuate this earnings management strategy in the fourth quarter.

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APPENDIX A

DERIVING THE PARTIAL-ADJUSTMENT MODEL

$$MDR^*_{jt} = \alpha X_{jt} \quad \text{(a)}$$

$$\alpha X_{jt} = \alpha_1 EBIT\_TA_{jt} + \alpha_2 MB_{jt} + \alpha_3 Dep\_TA_{jt} + \alpha_4 \ln(TA)_{jt} + \alpha_5 FA\_TA_{jt} + \alpha_6 R\&D\_Dum_{jt} + \alpha_7 R\&D\_TA_{jt} + \alpha_8 Ind\_Med_{jt} + \alpha_9 Rated_{jt} \quad \text{(b)}$$

$$MDR_{jt+1} - MDR_{jt} = \lambda (MDR^*_{jt} - MDR_{jt}) + \varepsilon_{jt+1} \quad \text{(c)}$$

$$MDR_{jt+1} - MDR_{jt} = \lambda (\alpha X_{jt} - MDR_{jt}) + \varepsilon_{jt+1} \quad \text{(d)}$$

$$MDR_{jt+1} = \lambda\alpha X_{jt} + (1-\lambda) MDR_{jt} + \varepsilon_{jt+1} \quad \text{(e)}$$

In Equation (a), assume that firms' target debt ratios, represented by MDR*, are a function of firm characteristics, represented by X, that prior research has demonstrated to impact capital structure. Equation (b) lists these nine characteristics. If companies set target leverage ratios and rebalance their capital structures to adjust to these targets, Model (c) captures this behavior. The left side represents the change in firms' debt ratios from one year to the next, and the right side represents the difference between these companies' target and actual debt ratios. Thus, λ represents the speed of adjustment, the proportion of the gap between firms' target and actual capital structures that closes during one year. Substituting Equation (a) into Model (c) yields Model (d), and rearranging Model (d) algebraically produces Model (e), the partial-adjustment model from Flannery and Rangan (2006).

APPENDIX B

CALCULATION OF MISS

$ETR_{i,q}$ = income $taxes_{i,q}$ (data6) / pretax $income_{i,q}$ (data23)

$Forecast_{i,q}$ = the last I/B/E/S consensus forecast $estimate_{i,q}$ (meanest) • common shares used to calculate $EPS_{i,q}$ (data15) / (1 – $ETR_{i,q}$)

$Actual_{i,q}$ = I/B/E/S actual $EPS_{i,q}$ (value) • common shares used to calculate $EPS_{i,q}$ (data15) / (1 – $ETR_{i,q}$)

$Preman_{i,q}$ = $Actual_{i,q}$ – $Earn\_eff_{i,q}$

If *Forecast* exceeds *Preman*, I code *Miss* as 1. If *Preman* exceeds or equals *Forecast*, I code *Miss* as 0.

VITA

Name:	Kirsten Abram Cook
Address:	Department of Accounting Mays Business School Texas A&M University 4353 TAMU College Station, TX 77843-4353
E-mail Address:	kcook@mays.tamu.edu

Education:	A.A., General Academics, McLennan Community College, 1999 B.B.A., Accounting, Baylor University, 2002 M.Acc., Accounting, Baylor University, 2002