The Persistence, Forecasting Ability, and Valuation Implications of the Tax Change Component of Earnings

Andrew P. Schmidt*

Abstract

I examine whether and under what circumstances changes in net income caused by changes in ETRs (*the tax change component*) persist and whether the tax change component aids in forecasting future earnings incremental to aggregate earnings excluding the tax change. I decompose the tax change component of earnings into an initial and revised portion, which I hypothesize to have differential persistence and forecasting implications. Finally, I utilize the Mishkin (1983) procedure to determine if the market recognizes the forecasting implications of the differential persistence of the initial and revised tax change components. My results indicate that the tax change component is negatively associated with future tax changes. I find that the initial tax change component is more persistent for future tax changes than the revised tax change component. Additionally, I find that the initial tax change component is useful in forecasting future earnings, while the revised tax change component is not. These results are consistent with my hypotheses that the initial and revised tax change components have differential persistence and forecasting implications, and dispute the notion that changes in ETRs are transitory. Mishkin (1983) test results indicate that the market underestimates the persistence of both the initial and revised tax change components.

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Comments welcome

* *Doctoral Candidate, Arizona State University, Tempe, AZ 85287-3606, Andrew.Schmidt@asu.edu*

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1.0. Introduction

This study investigates whether the market fully utilizes information from the effective tax rate (ETR) reconciliation. Specifically, I examine whether and under what circumstances changes in net income caused by changes in ETRs (*hereafter, the tax change component*) persist and whether the tax change component aids in forecasting future earnings incremental to aggregate earnings excluding the tax change. ETRs are likely to have implications for persistence and forecasting for two reasons. First, income taxes are of such magnitude that small changes in the ETR can lead to substantial changes in earnings. For example, in the third quarter of 2000, Hewlett-Packard lowered its year-to-date ETR from 24 percent to 23 percent, which added three cents ($31.12 million) to EPS (net income).[1] Second, recent academic literature, as well as the financial press, has identified ETR manipulation as an earnings management tool.[2] Dhaliwal, Gleason, and Mills (2002) find that firms lower ETRs as earnings absent tax management fall short of analyst forecasts.

Prior research indicates that the tax change component of earnings contains useful information. Guenther and Jones (2002) find that decreases in the tax change component are significantly related to positive market returns, and that the market is able to discriminate between potentially permanent and transitory ETR changes. Bauman and Shaw (2002) show that the first quarter's tax change component is positively associated with after-tax earnings changes in the same fiscal year.

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[1] Hewlett-Packard's reported EPS was $0.97; therefore a one percent reduction in the ETR resulted in a 3.1 percent increase in earnings. Bauman and Shaw (2002) report that, on average, the annual change in ETR accounts for approximately eight percent of the change in annual earnings.

[2] For example, see *Wall Street Journal*, 12/11/97, p. C1; and *Wall Street Journal*, 01/07/02, Heard on the Street, p. C1-C2; http://www.briefing.com/archives/storystk/20000817_storystk.htm, 08/17/00; and http://www.thestreet.com/p/rmoney/herbonthestreet-rm/10023056.html, 05/17/02.

However, a number of studies find that analysts have difficulty fully understanding this information. Plumlee (2003) finds that analysts fail to incorporate complex information in their ETR forecasts, which results in inefficient ETR forecasts. Bauman and Shaw (2002) find that analysts underreact to interim disclosures of ETR changes, while Abarbanell and Bushee (1997) find that analysts overreact to annual disclosures of ETR changes. Since analysts are viewed as sophisticated users of accounting information, this evidence of inefficiency in analyst forecasts suggests that security prices may fail to fully reflect this information. This study extends prior literature by testing whether the market fully incorporates the pricing effects of the persistence of the tax change component of earnings. I examine whether the market accurately assesses the persistence of the tax change component using the framework outlined by Mishkin (1983). Specifically, I use the Mishkin (1983) test to examine whether the market rationally prices the tax change component of earnings with respect to its one-year-ahead earnings implications.[3]

There is a growing body of research suggesting that market prices do not fully impound all publicly available information (Freeman and Tse 1989; Ou and Penman 1989; Bernard and Thomas 1989, 1990; Lev and Thiagarajan 1993; Sloan 1996; Abarbanell and Bushee 1997, 1998; Thomas 2000; Hanlon 2002). This study contributes to this line of research by examining a component of earnings that potentially impacts future earnings differently than other earnings components or aggregate earnings. Unusual changes (primarily decreases) in ETRs are often considered transitory by analysts (Lev and Thiagarajan 1993), and are often viewed as attempts at aggressive accounting by management rather than as improvements in the core operations of the business. However, not all changes in ETRs are necessarily transitory. It is likely that the items that have the most persistent effect on the annual ETR are anticipated and incorporated

[3] Sloan (1996), Collins and Hribar (2000), Barth and Hutton (2001), Beaver and McNichols (2001), Bradshaw, Richardson, and Sloan (2001), Defond and Park (2001), Hanlon (2002), and Xie (2001) use the Mishkin (1983) framework to test the mispricing of the persistence of accruals and cash flows.

into management's initial annual ETR estimate. If the differential persistence and forecasting implications of changes in ETRs are undetected or misinterpreted by the market, systematic mispricing may occur. I extend the literature on market efficiency by examining the extent to which market prices reflect differences in the implications of the revised tax change (a transitory component of earnings) versus both the initial tax change and aggregate earnings excluding the tax change (persistent components of earnings) for future earnings changes.

My results indicate that the tax change component is negatively associated with future tax changes. When I decompose the tax change component into an initial and revised portion, I find that the initial tax change component is more persistent for future tax changes than the revised tax change component. Additionally, I find that the initial tax change component is useful in forecasting future earnings, while the revised tax change component is not. These results are consistent with my hypotheses that the initial and revised tax change components have differential persistence and forecasting implications, and dispute the notion that changes in ETRs are transitory. The Mishkin (1983) test results indicate that the market underestimates the persistence of both the initial and revised tax change components. Results from supplemental tests further support the notion that the abnormal returns are a result of market mispricing rather than alternative explanations such as omitted risk factors.

The remainder of the paper is organized as follows. The next section presents an overview of the accounting for income taxes. Emphasis is placed on the issues surrounding the ETR reconciliation and how current reporting requirements affect my empirical proxies. Section 3 develops research questions and hypotheses. Section 4 outlines the research design, which includes the development of my empirical proxies, model specifications, and sample selection. Section 5 presents results and supplemental analyses. Section 6 concludes.

2.0. Accounting for Income Taxes

2.1. Overview

In 1992, the Financial Accounting Standards Board (FASB) issued Statement of Financial Accounting Standards No. 109, *Accounting for Income Taxes* (SFAS 109), which requires a comprehensive interperiod tax allocation using an asset-liability approach. Companies must recognize deferred tax assets and liabilities on all *temporary* differences, broadly defined as the difference between the tax basis of an asset or liability and its reported amount in the financial statements, which will result in deductible or taxable amounts in the future. SFAS 109 also requires companies to disclose a reconciliation of the reported amount of income tax expense attributable to continuing operations for the year to the amount of income tax expense that would result from applying domestic federal statutory rates to pretax income from continuing operations (FASB 1992, ¶47). The reconciling items are referred to as *permanent* differences. These types of differences between income for financial reporting and taxable income do not result in deductible or taxable amounts in the future.

Both temporary and permanent differences are disclosed in the income tax footnote of a firm's annual report. Temporary differences are disclosed in the deferred taxes section of the tax footnote, while permanent differences and tax rate adjustments are disclosed in the ETR reconciliation section of the footnote.[4] Since the focus of this study is to examine the information found in the ETR reconciliation, my discussion will concentrate on permanent differences.[5]

[4] Tax rate adjustments are special tax rates or tax credits that have the effect of lowering the statutory rate. Tax rate adjustments are not permanent or timing differences as they impact only the tax liability and not taxable income.
[5] See Keiso and Weygandt 1998; Revsine, Collins, and Johnson 1999; Wild, Bernstein, and Subramanyam 2001; Miller and Skinner 1998; or Philips, Pincus, and Rego 2002 for discussion of deferred taxes.

2.2. Effective Tax Rates

Except for a graduated rate on lower levels of income, corporate income is taxed at a uniform rate determined by tax law (presently 35 percent). The relationship between the income tax accrual and pretax income is influenced in part by *permanent tax differences*. Permanent differences can result from tax regulations where:

- Items are nontaxable: Common nontaxable income items include interest on tax-exempt municipal bonds and life insurance proceeds on an officer of the corporation.
- Items are nondeductible: Common nondeductible items include penalties and fines, key employee life insurance premiums, and in-process research and development in acquisitions.
- Special deductions: Common special deductions include tax exclusions on dividends from unconsolidated subsidiaries or from other domestic corporations.

In addition to permanent differences resulting from statutory tax law, the ETR reported by a company on pretax income can vary from the statutory rate for many other reasons, including:

- Property basis differs for financial and tax accounting due to reorganizations or combinations.
- Nonqualified and qualified stock option plans.
- Tax credits, including, but not limited to, the research and development credit or the foreign tax credit.
- Different tax rates on foreign income.
- Deferred tax valuation allowance account adjustments that affect income tax expense.
- Tax expense that includes both state and local income taxes, net of federal tax benefit.
- Tax loss carryforward benefits.

When a firm reconciles its ETR to the statutory rate, any item that results in a material difference between the ETR and the statutory rate must be reported.[6] The analysis of a firm's ETR reconciliation can provide important information regarding why an ETR deviates from the normal or expected rate, and whether or not the new rate will continue. Additionally, knowledge of the reasons for deviations and changes in a firm's ETR can be important in profitability

[6] If no individual reconciling item amounts to more than five percent of the amount computed by multiplying the income before tax by the applicable statutory Federal income tax rate, and the total difference to be reconciled is less than five percent of such computed amount, no reconciliation need be provided unless it would be significant in appraising the trend of earnings. Reconciling items that are individually less than five percent of income tax expense may be aggregated in the reconciliation (SEC Regulation §210.4-08(h)(2)).

analysis and income forecasting (Wild et al. 2001). Therefore, one objective of this paper is to examine whether and under what circumstances the tax change component persists and whether the tax change component aids in forecasting future earnings incremental to pretax earnings.

IBM's ETR reconciliation provides some anecdotal evidence regarding the use of this disclosure. IBM's earnings have been affected by ETR changes.[7] As shown in Exhibit 1, IBM reduced its ETR from 33% in 1997 to 30% in 1998. This ETR decrease, along with a reduction in the amount of common shares outstanding, accounted for virtually all of IBM's earnings growth in 1998. The reduction in the 1998 ETR, relative to 1997, was attributable to two reconciling items, 1) the foreign tax rate differential, which represents the difference between the U.S. statutory tax rate and the average tax rate of all foreign jurisdictions in which IBM does business, and 2) the valuation allowance, which represents an offset to a firm's deferred tax assets.[8] Both reconciling items returned to pre-1998 levels in 1999, giving the impression that reduced ETR in 1998 was transitory. Therefore, an investor might be wary of IBM's unusually low ETR when forecasting future earnings of the firm.

2.3. Interim Reporting Requirements

GAAP mandates that the quarterly reporting period be viewed as an integral part of the annual reporting period. APB Opinion No. 28 (APB 1973), SFAS No. 3 (FASB 1974) and FASB Interpretation No. 18 (FASB 1977) require firms to estimate many annual operating expenses and then allocate these estimates to interim periods based on forecasted figures. As the

[7] See also, *Wall Street Journal*, 12/11/97, p. C1; and *Wall Street Journal*, 01/07/02, Heard on the Street, p. C1-C2.
[8] In the Management Discussion and Analysis section of the 1998 10-K, management attributes the lower ETR to the company's further expansion into markets with lower statutory tax rates. However, an inspection of the geographic segments footnote reveals that IBM's foreign sales (assets) as a percentage of total sales (assets) *dropped* from 64.85% (58.40%) in 1997 to 64.84% (56.77%) in 1998.

fiscal year progresses, firms revise estimates and record estimation errors from earlier quarters (Rangan and Sloan 1998).

Income taxes are one type of expense that is subject to the interim reporting requirements. Quarterly tax expense is computed by estimating the ETR that is expected to be applicable for the full fiscal year.[9] The estimated annual ETR is then applied to the year-to-date ordinary income at the end of each interim period to compute the year-to-date tax expense.[10] The year-to-date tax expense of the prior quarter is then subtracted from the year-to-date tax expense of the current quarter to arrive at the current quarter's tax expense. This procedure is illustrated in the following footnote from Hewlett-Packard's Q3 2000 10-Q:

> HP's effective tax rate was 23% for the first nine months of fiscal 2000, reflecting the tax rate expected for the full fiscal year. The tax rate was 21.3% in the third quarter of 2000 due to a reduction in the annual effective tax rate from 24% to 23%. In 1999, the full-year effective tax rate was 26%, and the rate was 26.5% in both the third quarter and first nine months of the year. The year-to-year decrease in HP's effective tax rate was primarily the result of changes in the mix of our pretax earnings in various tax jurisdictions throughout the world.

I use the interim reporting requirements to decompose the tax change component into an initial and revised portion based on the first quarter estimate of the annual ETR. In arguments advanced in the hypothesis development section of the paper, I base my choice of the first quarter estimate on the notion that managers are likely to record the material elements of a firm's tax plan that affect the annual ETR during the first quarter of the fiscal year. This decomposition allows me to develop and test additional hypotheses regarding the persistence and forecasting ability of the tax change component of earnings.

[9] The estimated annual ETR should reflect anticipated tax credits, foreign tax rates, percentage depletion, capital gains rates, and other available tax planning alternatives.

[10] Ordinary income refers to pretax income before extraordinary items, discontinued operations, and cumulative effects of changes in accounting principles (FASB Interpretation No. 18, 1977, ¶9).

3.0. Research Questions and Hypotheses

3.1. The Persistence of the Tax Change Component of Earnings

The first objective of my paper is to document whether and under what circumstances changes in ETRs persist. There are numerous items that might affect the ETR change, and each of these items has different implications for future ETRs. For example, a change in the ETR caused by a favorable outcome from an IRS examination is probably transitory, while a change in the ETR caused by lower taxes incurred in foreign jurisdictions (often referred to as a foreign tax rate differential) may be more permanent depending on the extent to which the company maintains or expands its operations in low tax jurisdictions.[11] Other prominent items from the ETR reconciliation that may have different implications for ETR persistence include the utilization of NOLs, changes in the deferred tax asset valuation allowance, and merger and acquisition adjustments relating to intangibles.

Whether an ETR change is positive or negative also has implications for persistence. For example, financial analysts often view ETR decreases as transitory items, and prior literature (Lev and Thiagarajan 1993; Abarbanell and Bushee 1997, 1998; Amir, Lev, and Sougiannis 2000) tends to operate under this maintained hypothesis. However, Basu (1997) finds that earnings response coefficients of items that result in earnings increases, such as a decrease in the ETR, are larger than those of items that result in earnings decreases, suggesting that negative ETR changes may be more persistent than positive ETR changes. Stated formally, my first research question is:

R_1: Under what conditions are changes in annual ETRs persistent?

[11] In 2000, Intel recorded a $600 million ($0.09 per share) reduction in its income tax provision due to the reversal of previously accrued taxes. Further review of tax footnote revealed that this adjustment was due to the closure of an IRS examination.

APB 28 requires managers to make their best estimate of the firm's ETR that is expected to be applicable for the full fiscal year when computing interim income tax expense. Therefore, interim ETRs reflect management's private information about future ETRs and earnings. It is likely that the items that have the most material effect on management's estimate of the annual ETR are anticipated and incorporated into the initial (Q1) annual ETR estimate. Furthermore, analysts often view revisions (Q2, Q3, Q4) in estimated annual ETRs as attempts at aggressive accounting.

Similar reasoning can be used to examine decreases in ETRs. While most financial analysts view ETR decreases as transitory items, not all ETR decreases are necessarily transitory, *per se*. Firms spend billions of dollars each year on tax-planning activities, some of which are designed specifically to lower firm ETRs. These tax-planning activities have become an integral part of efficient organizational design (Scholes, Wolfson, Erickson, Maydew, and Shevlin 2002). Therefore, managers are likely to be aware of material items in their firm's tax plans that will result in ETR reductions. These material items are likely to be reflected in management's initial annual ETR estimate. Therefore, ETR decreases in later quarters are likely to be less persistent than the ETR decrease that is implicit in management's initial ETR estimate. This discussion leads to my first and second hypotheses:[12]

H_1: The initial (Q1) estimated annual ETR change is likely to be more persistent for future annual ETR changes than subsequent revisions (Q2, Q3, Q4) in the estimated annual ETR change.

H_2: For firms with *decreases* in annual ETRs, the initial (Q1) estimated annual ETR change is likely to be more persistent for future annual ETR changes than subsequent revisions (Q2, Q3, Q4) in the estimated annual ETR change.

[12] All hypotheses are stated in alternative form.

3.2. The Persistence of the Tax Change Component of Earnings for Future Earnings

In addition to examining the persistence of ETR changes for future ETR changes, I also assess whether ETR changes are useful in forecasting future earnings incremental to aggregate earnings excluding the tax change. Abarbanell and Bushee (1997) and Bauman and Shaw (2002) find that annual and interim ETR changes (respectively) are useful in forecasting future earnings changes. Earnings that are more persistent are expected to have greater implications for future earnings, therefore I expect that management's initial estimate of the annual ETR change will be more persistent for future earnings than revisions in the estimated annual ETR change.

I also examine whether ETR decreases are useful in forecasting future earnings incremental to aggregate earnings excluding the tax change. ETR decreases are of interest because they increase earnings. Similar to H_2, managers are likely to be aware of material items in their firm's tax-planning strategies that decrease ETRs, so their initial annual ETR estimate is likely to reflect these factors. Therefore, additional reductions in the annual ETR estimate are likely to be less predictive than the ETR decrease implicit in management's initial annual ETR estimate. Consistent with this statement, current research by Dhaliwal et al. (2001) suggests that firms manage earnings by decreasing their annual ETR from the third to the fourth quarter when earnings absent tax management fall short of analysts' forecasts. This discussion leads to my third and fourth hypotheses:

H_3: The initial (Q1) estimated annual ETR change is likely to be more persistent for future earnings than subsequent revisions (Q2, Q3, Q4) in the estimated annual ETR change.

H_4: For firms with *decreases* in annual ETRs, the initial (Q1) estimated annual ETR change is likely to be more persistent for future earnings than subsequent revisions (Q2, Q3, Q4) in the estimated annual ETR change.

3.3. Valuation Implications of the Persistence of the Tax Change Component of Earnings

My final objective is to determine if the market recognizes the forecasting implications of the differential persistence of the initial and revised tax change component. A number of studies (Lev and Thiagarajan 1993; Abarbanell and Bushee 1997, 1998; Bauman and Shaw 2002; Guenther and Jones 2002) find that ETR changes provide useful information to the market. However, the complexity of tax expense computations and the discretion in estimating tax accruals allow information asymmetry between managers and analysts, auditors, and shareholders to persist (Dhaliwal, et al. 2002). Consistent with this statement, Plumlee (2003) finds that analysts fail to incorporate complex information in their ETR forecasts, which results in inefficient ETR forecasts. Additionally, Abarbanell and Bushee (1997) find that analysts overreact to annual disclosures of ETR changes, while Bauman and Shaw (2002) find that analysts underreact to interim disclosures of ETR changes. Analysts are viewed as sophisticated users of accounting information, so this evidence of inefficient analyst forecasts raises the question of whether the persistence of annual ETR changes is priced fully by the market. This leads to my final hypothesis:

> H_5: The earnings expectations embedded in stock prices fail to reflect fully the persistence of unexpected initial (Q1) and revised (Q2, Q3, and Q4) ETR changes.

4.0. Research Design

4.1. Variable Definitions

To focus on the impact of an ETR change on earnings, I follow Lev and Thiagarajan (1993) and decompose the annual change in earnings, $\Delta E_t = E_t - E_{t-1}$, into two components:

1. The change in pretax earnings (ΔPTE_t), at last year's effective tax (ETR_{t-1}) level – $\Delta PTE_t(1 - ETR_{t-1})$, and
2. The effect of the annual tax rate change on current pretax earnings – $PTE_t(ETR_{t-1} - ETR_t)$:

$$\Delta E_t = \Delta PTE_t(1 - ETR_{t-1}) + PTE_t(ETR_{t-1} - ETR_t). \quad (1)$$

In equation (1), $PTE_t(ETR_{t-1} - ETR_t)$, which represents the change in net income due to the change in the annual ETR, is my measure of the tax change component of earnings.[13] The interim reporting requirements prescribed by APB Opinion No. 28 and FASB Interpretation No. 18 allow me to further decompose the tax change component of earnings into an initial $[PTE_t(ETR_{t-1} - ETRQ1_t)]$ and a revised portion $[PTE_t(ETRQ1_t - ETR_t)]$. In accordance with APB Opinion No. 28, $ETRQ1_t$ represents management's first quarter estimation of the ETR that is expected to be applicable for the full fiscal year. The resulting decomposition of earnings is:

$$\Delta E_t = \Delta PTE_t(1 - ETR_{t-1}) + PTE_t(ETR_{t-1} - ETRQ1_t) + PTE_t(ETRQ1_t - ETR_t) \quad (2)$$

A firm's ETR is measured as:

$$ETR_t = \frac{IncomeTaxExpense_t}{PTE_t} \quad (3)$$

Following Gupta and Newberry (1997), the ETR is set to 1 when the ETR is greater than 100% and to 0 when the ETR is negative.[14]

[13] The following example, adapted from Lev and Thiagarajan (1993), should provide intuition to this measure. Assume:

	t	$t-1$
Pre-tax income	120	100
ETR	0.25	0.40
Net income	90	60

Following equation (1), the net income change, 30, consists of the pre-tax earnings change net of the prior tax rate, $20 \times 0.60 = 12$, and the impact of the tax rate change, 120 (0.40 – 0.25) = 18. I refer to the latter component of the earnings change as the tax change component.

[14] Interim (annual) *Compustat* data items used for each variable are: Eamings = 8 (18), Income Tax Expense = 6 (16), and Pretax Income = 23 (170).

4.2. Model Development

4.2.1. The Persistence of the Tax Change Component of Earnings

The first objective of this paper is to examine the persistence, or autocorrelation, of the tax change component of earnings. I scale all earnings variables by average total assets (*Compustat* annual data item #6) to control for differences in size across firms and over time. To examine whether changes in annual ETRs persist into future annual ETR changes, I estimate the following equation (firm subscripts are omitted):

$$TCC_{t+1} = g_0 + g_1 TCC_t + e_{t+1} \quad (4)$$

where *TCC* represents the tax change component of earnings – $PTE_t(ETR_{t-1} - ETR_t)$. A slope coefficient equal to 0 would suggest that *TCC* follows a random walk (i.e., the earnings component is permanent), while a slope coefficient equal to -1 would suggest that *TCC* is purely transitory. A slope coefficient greater than 0 would indicate growth in *TCC*.

To examine whether decreases (increases) in ETRs persist, I also estimate equation (4) for only those firms with decreases (increases) in the lagged tax change component of earnings. H_1 predicts that equation (4) is misspecified since it implicitly constrains the coefficients on the initial and revised tax change components of earnings to be equal. The specification implied by H_1 is:

$$TCC_{t+1} = d_0 + d_1 INTCC_t + d_2 REVTCC_t + e_{t+1} \quad (5)$$

where *INTCC* represents the initial tax change component of earnings [$PTE_t(ETR_{t-1} - ETRQ1_t)$] and *REVTCC* represents the revised tax change component of earnings [$PTE_t(ETRQ1_t - ETR_t)$]. H_1 will be supported if $d_1 > d_2$. The larger coefficient predicted on the initial relative to the revised tax change component of earnings reflects the higher persistence expected from the

initial tax change component of earnings. I test H_2 by estimating equation (5) for firms with ETR decreases. Similar to H_1, H_2 will be supported if $d_1 > d_2$.

4.2.2. The Persistence of the Tax Change Component of Earnings for Future Earnings

The second objective of this paper is to test whether the tax change component of earnings aids in forecasting future earnings incremental to aggregate earnings excluding the tax change. Finding a significant positive relation for any coefficient indicates that the component is incrementally informative in predicting future earnings. I test H_3 and H_4 by estimating the following equation:

$$E_{t+1} = d_0 + d_1 ATE_t + d_2 INTCC_t + d_3 REVTCC_t + v_{t+1} \quad (6)$$

where *E* represents income before extraordinary items and *ATE* represents aggregate earnings excluding the tax change component (*E – TCC*). H_3 will be supported if $d_2 > d_3$. The larger coefficient predicted on the initial relative to the revised tax change component of earnings reflects the higher persistence expected from the initial tax change component of earnings. I test H_4 by estimating equation (6) for firms with ETR decreases. Similar to H_3, H_4 will be supported if $d_2 > d_3$. Although it is not stated formally, I expect that $d_2 > 0$ and $d_3 \leq 0$ for both H_3 and H_4.

4.2.3. Valuation Implications of the Persistence of the Tax Change Component of Earnings

4.2.3.1. Equation Estimation

The third objective of this paper is to test whether the market fully incorporates the forecasting implications of the differential persistence of the initial and revised tax change components. To test H_5, I estimate the following system of equations in accordance with the Mishkin (1983) framework, developed to test rational expectations hypotheses in macroeconomics:

$$E_{t+1} = d_0 + d_1 ATE_t + d_2 INTCC_t + d_3 REVTCC_t + v_{t+1} \quad (7)$$

$$AR_{t+1} = w_0 + w_1(E_{t+1} - d_0 - d_1^* ATE_t - d_2^* INTCC_t - d_3^* REVTCC_t) + e_{t+1} \quad (8)$$

where AR_{t+1} = the abnormal return in year *t*. All other variables are defined previously.

Equation (7) is a *forecasting* equation, which depicts the actual time-series relation of aggregate earnings excluding the tax change, the initial tax change component, and the revised tax change component to future earnings. Each d coefficient is a measure of the persistence of an earnings component for future earnings. For each tax change component, a slope coefficient of 0 would indicate that the earnings component is purely transitory, while a coefficient of 1 would indicate that the earnings component follows a random walk. A slope coefficient greater than 1 would indicate growth in the component.[15]

Equation (8) is a *valuation* equation, which estimates the relation between unexpected movements in stock prices and the unexpected portion of earnings. Expected earnings are based on last year's earnings and the tax change components. Mishkin (1983) suggests that equation (8) provides an estimate of the market's *perceived* time-series behavior of earnings and tax change components. The underlying intuition is that unexpected movements in stock prices in the current period are related only to unexpected information received that same period (Thomas 2000). Because earnings and the initial and revised tax change components of earnings are public information, market efficiency requires $d_1 = d_1^*$, $d_2 = d_2^*$, and $d_3 = d_3^*$. If any pair of coefficients is not equal, the market's perception of earnings persistence differs from the historical time-series pattern.

[15] Since equation (7) is a levels model, the expected coefficients differ from the expected coefficients for equations (3) and (4), which are changes models.

The system of (7) and (8) is estimated jointly in two stages using iterative generalized non-linear least squares (Mishkin 1983).[16] In the first stage, I jointly estimate an unconstrained system of equations (7) and (8). In the second stage, I impose the rational pricing constraints $d_q = d_q^*$ (q = 1, 2, or 3) and re-estimate equations (7) and (8) jointly. Market efficiency is tested with a likelihood ratio statistic:

$$2n\log(SSR^c / SSR^u) \sim c^2(q) \tag{9}$$

where:

n	=	The number of observations.
q	=	The number of constraints imposed by market efficiency.
SSR^c	=	The sum of squared residuals from the constrained weighted system.
SSR^u	=	The sum of squared residuals from the unconstrained weighted system.

4.2.3.2. Abnormal Return Calculation

Abnormal returns are calculated as the stock's 12-month buy-and-hold return beginning four months after the end of the fiscal year minus the buy-and-hold value weighted return of the comparable size/book-to-market/prior year return portfolio over the same 12-month period.

$$AR_{it} = \prod_{t=1}^{t}(1+R_{it}) - \prod_{t=1}^{t}(1+E(R_{it})) \tag{10}$$

Extending the return interval four months beyond the end of the fiscal year helps to ensure that almost all firms' financial statements are publicly available (Sloan 1996; Collins and Hribar 2000; Thomas 2000; Beaver and McNichols 2001; Defond and Park 2001; Xie 2001).

I compute expected returns using the comparison portfolio approach outlined by Daniel, Grinblatt, Titman, and Wermers (1997), consistent with Thomas (2000). The first step in forming the portfolios consists of selecting all stocks that have calendar year-end market

[16] The use of nonlinear least squares in this case is theoretically equivalent to full information maximum likelihood estimation (FIML). Mishkin (1983) utilizes this procedure rather than FIML because it is empirically more tractable.

capitalization values available on CRSP and fiscal year-end book value data available on *Compustat* (annual data item #60). Only firms with positive book values are included.

125 portfolios are formed based on a triple-sort on each firm's market value of equity, book-to-market ratio, and prior year return. Stocks are first sorted into quintiles based on market capitalization at the beginning of the year of portfolio formation. The breakpoints for this sort are based on NYSE firms only.

Next, the stocks within each size quintile are sorted into quintiles based on their industry-adjusted book-to-market ratios. The book-to-market ratio is the ratio of book value at the end of the fiscal year prior to the year of portfolio formation to the capitalization value at the beginning of the calendar year of portfolio formation. Book-to-market ratios are industry-adjusted by subtracting the mean industry book-to-market ratio over the sample period from the individual stock's book-to-market ratio, where industries are defined along two-digit SIC codes.

Finally, the firms in each of the 25 size/book-to-market portfolios are sorted into quintiles based on their prior 12-month return ending one month prior to portfolio formation. This method avoids problems associated with the bid-ask bounce and monthly return reversals (Jegadeesh 1990).

4.3. Sample Selection Procedures and Sample Profile

I investigate my research objectives using a sample of U.S. *Compustat* firms between 1994 and 2000 with available annual and quarterly data. Similar to Hanlon (2002) and Philips, Pincus, and Rego (2002), I use this sample period for two reasons. First, the implementation of SFAS 109 in 1993 significantly changed the accounting for income taxes. Thus, using firm-years after the accounting change provides consistent accounting over the sample period.

Second, the highest statutory corporate tax rate increased to 35% from 34% for tax years after 1993. Thus, all firm-years in the sample are subject to the same top statutory tax rate.

To be included in the sample, firm-year observations must meet the following tests. First, I begin with all U.S. firm-years with the requisite data needed to compute the variables used in the empirical analysis. Next, due to the difficulty in interpreting ETRs when a firm has negative pretax income, I include only firm-years with positive pretax income. Third, utilities, financial institutions, mutual funds, trusts, REITs, limited partnerships, and other flow through entities are deleted due to different reporting requirements and varying incentives to manage earnings and tax plan (Hanlon 2002; Philips, Pincus, and Rego 2002). Finally, to remove the effects of outliers from the data, I drop the highest and lowest one percent of the observations for each variable in year *t* (Kothari and Zimmerman 1995; Collins, Maydew, and Weiss 1997; Fama and French 1998; Barth, Beaver, Hand, and Landsman. 1999; Hanlon 2002). Extreme returns or earnings in year $t + 1$ are not eliminated since this would introduce hindsight bias in the results (Thomas 2000). Panel A of table 1 provides a summary of the sample selection process. Panel B of table 1 indicates that the observations are distributed fairly uniformly throughout the sample period.

5.0. Results

5.1. Descriptive Statistics

Table 2 reports descriptive statistics for the variables used in this study. Panel A describes the variables that I use in the calculation of the tax change component of earnings. Although the average annual ETR in the prior and current year is 34.50 percent and 34.74 percent, respectively, the average ETR in Q1, which represents management's expectation of the annual ETR, is 35.45 percent. $ETRQ1_t$ is significantly higher than ETR_{t-1} and ETR_t (t = -12.3143

and -12.3865, respectively).[17] This would seem to indicate that management sets the estimate of the annual ETR too high in Q1, perhaps to create a reserve from which future earnings can be drawn.

Panel B reports the descriptive statistics for the variables used in the regression analyses. The mean of E_{t+1} is 0.0850, which indicates the average return on assets (ROA) for the sample firms is approximately 8.5 percent.[18] The average TCC_t decreases ROA by 0.06 percent.[19] $INTCC_t$ decreases ROA by approximately 0.13 percent on average, while $REVTCC_t$ increases ROA by approximately 0.06 percent on average. Therefore, for the average firm in the sample, approximately 46 percent of $INTCC_t$ reverses by year-end. This result is consistent with the results from panel A and quantifies the impact of tax changes on earnings.

Panel C of table 2 outlines the sample profile by industry.[20] The majority of the sample is clustered in four industries: durable manufacturers (23.92 percent), computers (10.59), retail (14.15 percent), and finance, insurance, and real estate (9.76 percent). I also examine the means of TCC_t, $INTCC_t$, and $REVTCC_t$ `at the industry level in panel C of table 2. The degree of reversal in $INTCC_t$ by the end of the year is startling for some industries. For example, in the food industry, 125 percent of $INTCC_t$ reverses by year-end, while 75.00 percent of $INTCC_t$ reverses by year-end for firms in the chemicals industry. Other industries exhibiting this strong reversal in $INTCC_t$ include textiles, printing and publishing (55.56 percent), transportation (57.14 percent), pharmaceuticals (64.71 percent), computers (56.25 percent) and durable manufacturers (52.94 percent).

[17] Similar inferences are obtained using the nonparametric Wilcoxon signed-rank test. Specifically, $ETRQ1_t$ is significantly higher than ETR_{t-1} and ETR_t (z = -16.563 and -21.969, respectively).
[18] All regression variables are scaled by average total assets.
[19] An increase in the ETR from year t to $t + 1$ results in a negative value for the tax change component.
[20] The industry breakdown is adapted from Barth, Beaver, Hand, and Landsman (1999) and Rajgopal, Shevlin, and Venkatachalam (2001). SIC codes are contained in panel C of table 2.

Table 3 reports Pearson (below the diagonal) and Spearman (above the diagonal) correlations. TCC_t is negatively correlated with TCC_{t+1} (r_P = -0.1003, p = 0.0000 and r_S = -0.1177, p = 0.0000), while $REVTCC_t$ is the only portion of the tax change component that is correlated with TCC_{t+1} (r_P = -0.1485, p = 0.0000 and r_S = -0.1155, p = 0.0000). $REVTCC_t$ is also positively correlated with E_{t+1} (r_P = 0.0254, p = 0.0111 and r_S = 0.0316, p = 0.0016), while $INTCC_t$ is negatively correlated with ATE_t (r_P = -0.0393, p = 0.0031 and r_S = -0.0166, p = 0.0968).[21] Finally, the correlations between $INTCC_t$ and $REVTCC_t$ are significantly negative (r_P = -0.2678, p = 0.0000 and r_S = -0.2345, p = 0.0000).

5.2. The Persistence of the Tax Change Component of Earnings

Table 4 presents the results from estimating equation (4) using OLS.[22] Because the data are pooled, I use Huber-White robust standard errors (Rogers 1993, generalizing White 1980), which are robust to heteroskedasticity and serial correlation and correct for dependence within a cluster of related observations. The coefficient on TCC_t is -0.1459 (p = 0.000), which indicates that approximately 15 percent of the tax change component reverses in the subsequent year. The coefficient on TCC_t for the subsample of firms with ETR decreases is -0.5416 (p = 0.000), while the coefficient on TCC_t for the subsample of firms with ETR increases is 0.0077 (p = 0.700).[23]

Tests of H_1 and H_2 are provided in table 5. These tests do not constrain the persistence coefficients on the initial and revised tax change component to be equal. The estimation results in panel A reveal that the majority of the reversal in the tax change component of earnings is

[21] This result is inconsistent with Bauman and Shaw (2002), who find that TAX_Q1_t (my measure of $INTCC_t$) is positively correlated to EPS changes over the last nine months of the same year.

[22] Results from the Breusch-Pagan (1980) Lagrange Multiplier Test (c^2 = 0.59, p = 0.4431) indicate that a fixed or random effects specification is not appropriate for equation (4). This result holds for all specifications of equations (4) – (6).

[23] All specifications of equations (4)-(6) were also estimated using decile ranks in place of the actual values of the variables. The tenor of the results is unchanged. These results are available upon request.

attributable to $REVTCC_t$ (d_2 = -0.4263, p = 0.000), rather than $INTCC_t$ (d_1 = -0.0897, p = 0.000). An F-test rejects the hypothesis that the coefficients are equal (F = 39.53). This is consistent with H_1; the initial tax change component of earnings is more persistent than the revised tax change component of earnings.

Similar inferences can be drawn from the results in panel B of table 5. For firms that had ETR decreases, the coefficient on $INTCC_t$ is -0.3903 (p = 0.000) and the coefficient on $REVTCC_t$ is -0.7156 (p = 0.000). An F-test rejects the hypothesis that the coefficients are equal (F = 19.33). This result is consistent with H_2; for firms with ETR decreases, the initial tax change component of earnings is more persistent than the revised tax change component of earnings.

The magnitude of the coefficient on $INTCC_t$ in both specifications of equation (5) suggests that $INTCC_t$ contains both permanent and transitory components.[24] Because management is most likely aware of material items in their firm's tax plans that would affect the ETR, one would expect the initial tax change component to be more predictive of future values of the overall tax change component. However, the descriptive statistics indicate that management may set the initial estimate of the annual ETR too high, which may induce a transitory element into the initial tax change component. The magnitude of the coefficient on $REVTCC_t$ is also surprising and is suggestive of earnings management.

5.3. The Persistence of the Tax Change Component of Earnings for Future Earnings

Table 6 reports the estimation results for equation (6), in which future earnings are regressed on current earnings, the initial tax change component, and the revised tax change component. The estimate of ATE_t in panel A is 0.8000 (p = 0.000), which is consistent with the

[24] Tests of the hypotheses that $INTCC_t$ = -1 and $REVTCC_t$ = -1 are both rejected, which suggests that neither component is completely transitory.

results reported in Sloan (1996).[25] The coefficient on $INTCC_t$ is 0.2238 (p = 0.001) and the coefficient on $REVTCC_t$ is -0.1978 (p = 0.117). An F-test rejects the hypothesis that the coefficients are equal (F = 12.85). Therefore, for the full sample, the initial tax change component of earnings is more useful than the revised tax change component of earnings in predicting future earnings.[26]

Panel B of table 6 reports the results of equation (6) for firms with ETR decreases. The estimate of $INTCC_t$ is 0.5363 (p = 0.027) and the estimate of $REVTCC_t$ is -0.1474 (p = 0.500). In untabulated results, I find that the coefficient on TCC_t in the regression $E_{t+1} = d_0 + d_1 ATE_t + d_2 TCC_t + v_{t+1}$ is not significantly different from zero (d_2 = 0.2109, p = 0.298), which supports the notion that ETR decreases are transitory. However, an F-test rejects the hypothesis that the initial and revised tax change components are equal (F = 11.69), which is implicitly assumed by including TCC_t in the above regression. By decomposing TCC_t into an initial and revised portion, the persistent element of the tax change is identified, which disputes the conjecture of analysts that decreases in ETRs are transitory.

In addition to the H_3 and H_4 being supported, I also find that d_2 is greater than zero and d_3 is less than zero in both specifications of equation (6), which suggests that management's initial ETR estimate reflects the persistent information. Untabulated results from estimating equation (7) for firms with ETR increases show that $INTCC_t$ is less persistent (d_2 = 0.2408) for future earnings than is $INTCC_t$ for firms with ETR decreases (d_2 = 0.5363), which is consistent with the findings in Basu (1997).

[25] Sloan (1996) reports a coefficient of 0.841 on earnings (Panel A, Table 1).
[26] This result is consistent with the findings in Bauman and Shaw (2002). Specifically, their estimate of interim ETRs, which is the same as my initial tax change component, is positively related to future earnings.

5.4. Valuation Implications of the Persistence of the Tax Change Component of Earnings

Panel A of table 7 reports results from the estimation of the system of equations (7) and (8) on the full sample. For ATE_t, the valuation coefficient ($d_1^* = 0.7575$) is slightly smaller than the forecasting coefficient ($d_1 = 0.8000$), which suggests that the market underprices earnings relative to its ability to forecast one-year-ahead earnings. The likelihood ratio statistic reported in panel B indicates that the underpricing is not statistically significant ($c^2(1) = 1.982$, $p = 0.159$), which is consistent with Sloan (1996).

The market appears to underestimate both the persistence of $INTCC_t$, and the persistence of $REVTCC_t$ (i.e., the ratio of d_k^* to d_k is greater than one).[27] Specifically, the valuation coefficient ($d_2^* = 0.3444$) is larger than the forecasting coefficient ($d_2 = 0.2238$) for $INTCC_t$, and the valuation coefficient ($d_3^* = -1.2909$) is larger than the forecasting coefficient ($d_3 = -0.1978$) for $REVTCC_t$. The likelihood ratio statistics reported in panel B indicate that the underpricing of $INTCC_t$ is not statistically significant ($c^2(1) = 0.242$, $p = 0.623$), while the underpricing of $REVTCC_t$ is statistically significant ($c^2(1) = 6.772$ $p = 0.009$).

5.5. Abnormal Returns to a Hedge Strategy

The findings from the Mishkin (1983) test suggest that stock prices do not accurately reflect the time-series properties of the revised tax change component of earnings. However, the Mishkin (1983) test is not direct evidence of market inefficiency for a number of reasons. First, the Mishkin (1983) test is a joint test of both the Mishkin framework (model of equilibrium output) and market efficiency (rational expectations). Therefore, unequal coefficients across

[27] Since $INTCC_t$ and $REVTCC_t$ are negative income (i.e., expense) items, a ratio of d_k^* to d_k greater than (less than) one indicates underpricing (overpricing).

equations could be attributable to model misspecification. Second, the coefficients are estimated from a set of contemporaneous observations. Therefore, time-series expectations models use future information the market did not have as it was forming prices, which results in a potential hindsight bias (Beaver and McNichols 2001; Whalen 2001). Therefore, I supplement the Mishkin (1983) tests by estimating return regressions using the Fama and MacBeth (1973) technique.

The Fama and MacBeth (1973) approach calls for the formation of zero-investment hedge portfolios. To create long and short positions of the hedge portfolios, I first rank firms on the magnitude of ATE_t and equally assign firms to one of 10 portfolios each year. Next, within each of the 10 portfolios, I assign firms equally into deciles (0, 9) based on $REVTCC_t$ and divide the decile number by nine so each observation related to $REVTCC_t$ takes on a value ranging from zero (for the lowest decile) to one (for the highest decile).[28] The hedge portfolio is formed by taking a long position in firms in the highest decile of $REVTCC_t$ and a short position in firms in the lowest decile of $REVTCC_t$, and has an average of 65.57(65.71) firms per year.

I implement the Fama and MacBeth (1973) approach by estimating the following cross-sectional regression for each of the seven years in the sample:

$$AR_{t+1} = d_0 + d_1 REVTCC_t^{dec} + x_{t+1} \quad (11)$$

where $REVTCC_t^{dec}$ represents the scaled portfolio decile rank of the revised tax change component of earnings and AR_{t+1} represents the stock's 12-month buy-and-hold return beginning four months after the end of the fiscal year minus the buy-and-hold value weighted return of the comparable size/book-to-market/prior year return portfolio over the same 12-month period. In

[28] I form the portfolios in this manner in order to rank firms on $REVTCC_t$ while controlling for the level of ATE_t. Firms in the lowest quintile are firms with highest values of $REVTCC_t$ for a given level of ATE_t, while firms in the highest quintile have the lowest values of $REVTCC_t$ for a given level of ATE_t.

order for the regression coefficients to be interpreted as zero-investment portfolio returns, the returns used in the regressions must be for the same time period and the accounting information used to create the hedge portfolios must coincide chronologically and be publicly available at the time of portfolio formation. Thus, I estimate equation (11) using firms with December year-ends only, which reduces my sample size to 4,747 firm-year observations.[29] Significance tests of d_1 are based on the standard error calculated from the distribution of the annual coefficients. Assuming independence through time, this test has the added benefit of controlling for cross-correlation in the residuals (Bernard 1987).

The results from the Fama and MacBeth (1973) regressions in Table 8 generally confirm the results of the Mishkin (1983) test. There is a positive association between $REVTCC_t$ and future returns, however the association is marginally significant (d_1 = 0.1052, p = 0.0721). The positive sign on $REVTCC_t$ is consistent with the difference in historical and security market weightings documented using the Mishkin (1983) framework. Because the market underestimates the persistence of $REVTCC_t$, there should be positive abnormal returns for portfolios ranked on $REVTCC_t$. Thus, the abnormal return to a trading strategy based on $REVTCC_t$ totals 10.52%

5.6. Distinguishing between Market Mispricing and the Failure to Control for Risk

Even though commonly identified risk factors were controlled for in the measure of abnormal returns, there may be other unidentified risk factors that represent an additional competing explanation for the potential mispricing of $REVTCC_t$. In order to help rule out mis-estimated risk as an alternative explanation to market inefficiency, I employ three additional tests

[29] To insure that the length of the earnings announcement period relative to the non-announcement period remains constant across firms, I also require firms to have *Compustat* earnings announcement dates for all four quarters in the subsequent year and these dates must fall within the 12-month buy-and-hold return interval (Thomas 2000).

suggested by Bernard, Thomas, and Whalen (1997). They suggest that market mispricing is more likely when (1) abnormal returns on zero-investment hedge portfolios are consistently positive each period, (2) these abnormal returns are concentrated around subsequent earnings dates, and (3) the abnormal returns do not persist for more than one year subsequent to the portfolio formation. The results of tests designed to capture these phenomena should clarify alternative explanations to market mispricing.

The calendar year abnormal returns are presented in Figure 1. The hedge portfolio generates positive abnormal returns in every year except 1996, which had a return of -2.79%. A consistent pattern of positive abnormal returns is consistent with a market that fails to recognize the implications of current earnings for future earnings. When subsequent earnings are reported different than expected, the market corrects for its prior (incorrect) beliefs.

The second test involves determining whether the market corrections to the hedge portfolio are clustered around future earnings announcements. If abnormal returns are the result of the market failing to understand fully the time-series properties of earnings (or its components), then absent other information events, earnings announcements are the points at which the market realizes that earnings are different than expectations and the price corrects. To perform this analysis, I separate abnormal returns into announcement and non-announcement periods.

Following Bernard and Thomas (1990), the announcement period is defined as the four three-day intervals surrounding the quarterly earnings announcement in the subsequent year. The three-day period starts two trading days prior to and ends on the *Compustat* earnings announcement date. The non-announcement period includes all trading days over the 12-month period, excluding the 12 announcement period days. The announcement (non-announcement)

period returns are measured as the raw buy-and-hold return over the announcement (non-announcement) period minus the value-weighted buy-and-hold return of the comparable size/book-to-market/prior year return portfolio over the announcement (non-announcement) period. The announcement period averages 12 trading days, while the non-announcement period averages 242 trading days.

Initial results (not tabulated) of the tests that determine if the market corrections to the hedge portfolio are clustered around future earnings announcements reveal that the average announcement period abnormal return to the long position of the hedge portfolio is 3.13 percent and the average non-announcement abnormal return for the long position is 5.73 percent. Therefore, approximately 36 percent of the total return to the long position of the hedge portfolio is clustered around future earnings announcement dates, even though the 12-day announcement period represents only 4.72 percent of the annual buy-and-hold return interval. The average positive abnormal return as well as the concentration of abnormal returns around future earnings announcements provides evidence consistent with market mispricing, not mis-estimated risk.

Unlike the long position, the negative abnormal returns to the short position do not cluster around future earnings announcement dates. Instead, I find the average announcement period abnormal return to the short position of the hedge portfolio is 3.72 percent and the average non-announcement abnormal return for the short position is -5.73 percent. The short positions consist of firms expecting to do poorly. Soffer, Thiagarajan, and Whalther (2000) find that "bad news" firms tend to release all of their negative information during an earnings preannouncement, which leads to positive surprises at the earnings announcement date. In future supplemental tests, I plan to extend the announcement period window in order to capture preannouncement news.

6.0. Conclusions

I examine whether and under what circumstances changes in net income caused by changes in ETRs (*the tax change component*) persist and whether the tax change component aids in forecasting future earnings incremental to aggregate earnings excluding the tax change. ETRs are likely to have implications for persistence and forecasting for two reasons. First, income taxes are of such magnitude that small changes in the ETR can lead to substantial changes in earnings. Second, recent academic literature, as well as the financial press, has identified ETR manipulation as an earnings management tool. Prior research indicates that the tax change component of earnings contains useful information (Lev and Thiagarajan 1993; Guenther and Jones 2002; Bauman and Shaw). However, a number of studies find that analysts have difficulty fully understanding this information (Abarbanell and Bushee 1997; Bauman and Shaw 2002; Plumlee 2003). This study extends prior literature by testing whether the market fully incorporates the pricing effects of the persistence of the tax change component of earnings.

My results indicate that the tax change component is negatively associated with future tax changes. When I decompose the tax change component into an initial and revised portion, I find that the initial tax change component is more persistent for future tax changes than the revised tax change component. Additionally, I find that the initial tax change component is useful in forecasting future earnings, while the revised tax change component is not. These results are consistent with my hypotheses that the initial and revised tax change components have differential persistence and forecasting implications, and dispute the notion that changes in ETRs are transitory. The Mishkin (1983) test results indicate that the market overestimates the persistence of, and thus overprices, both the initial and revised tax change components. Results

from supplemental tests further support the notion that the abnormal returns are a result of market mispricing rather than alternative explanations such as omitted risk factors.

An additional objective of this paper is to identify the sources of the cross-sectional variation in the persistence of the tax change component of earnings. In addition to the tests reported in *Section 5.2.*, I plan to conduct additional tests concerning the circumstances under which the tax change component persists. In order to identify the sources of the cross-sectional variation in the persistence of the tax change component of earnings, I am collecting data from the ETR reconciliation of the income tax footnote of SEC 10-K filings.

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Exhibit 1

IBM Corporation's 1999 Effective Tax Rate Reconciliation

For the year ended December 31:	***1997***	***1998***	***1999***
Statutory rate	35%	35%	35%
Foreign tax differential	(3)	(6)	(2)
State and local	1	1	1
Valuation allowance related items	-	(1)	-
Other	-	1	-
Effective rate	33%	30%	34%

Table 1
Sample Selection and Composition: 1994-2000[1]

Panel A: Sample Selection

Description	N
U.S. Firms with Available *Compustat* Data	37,494
Less:	
Negative pretax income	16,636
Regulated Industries[2]	8,232
Missing CRSP Returns[3]	2,093
Extreme 1%	547
Final Sample	9,986

Panel B: Sample Distribution by Year

Year	Firms
1994	1,207
1995	1,341
1996	1,533
1997	1,550
1998	1,459
1999	1,489
2000	1,407
Total Firm Years:	9,986

[1] This table presents the sample selection criteria. I use the sample period of 1994-2000 for two reasons. First, the implementation of SFAS 109 in 1993 significantly changed the accounting for income taxes. Thus, using firm-years after the accounting change provides consistent accounting over the sample period. Second, the highest statutory corporate tax rate increased to 35% from 34% for tax years after 1993. Thus, all firm-years in the sample are subject to the same top statutory tax rate.
[2] Excluded industries include (four-digit SIC Codes in parentheses): Utilities (4900-4999), Financial Institutions (6000-6099), Mutual Funds (6726), Trusts (6792), REITs (6798), Limited Partnerships (6799), and Other Flow-Through Entities (6795).
[4] Observations were excluded in the merging of *Compustat* and CRSP data sets.

Table 2
Descriptive Statistics

Panel A: Financial Variables (N = 9,986)[1]

	Mean	*SD*	*Q1*	*Med*	*Q3*
$Assets_t$	4103.95	25060.99	120.592	397.599	1461.745
PTE_t	282.69	1084.69	12.651	43.321	143.500
ETR_t	0.3474	0.0917	0.3289	0.3700	0.3939
ETR_{t-1}	0.3450	0.0922	0.3290	0.3700	0.3947
$ETRQ1_t$	0.3545	0.0952	0.3378	0.3749	0.3980

Paired t-test	*t-statistic*	*p-value*
H_0: $ETRQ1_t = ETR_t$	-12.3865	0.0000
H_0: $ETR_{t-1} = ETRQ1_t$	-12.3143	0.0000

[1] This panel reports descriptive statistics of the variables used to form the regression variables. *Assets* and *PTE* are reported in $millions.

Assets = Average total assets (*Compustat* annual item #6)
PTE = Pretax income (*Compustat* annual item #170)
ETR = Effective tax rate (*Compustat* annual item #16 ÷ *PTE*)
ETRQ1 = Q1 Effective tax rate (*Compustat* quarterly item #16 ÷ *Compustat* quarterly item #23)

Panel B: Regression Variables (N = 9,986)[1]

	Mean	*SD*	*Q1*	*Med*	*Q3*
E_{t+1}	0.0850	0.0561	0.0461	0.0736	0.1105
AR_{t+1}	0.0706	0.7292	-0.2861	-0.0448	0.2519
TCC_{t+1}	-0.0004	0.0098	-0.0014	0.0000	0.0015
ATE_t	0.0859	0.0525	0.0476	0.0746	0.1127
TCC_t	-0.0006	0.0068	-0.0017	0.0000	0.0015
$INTCC_t$	-0.0013	0.0067	-0.0019	-0.0001	0.0007
$REVTCC_t$	0.0006	0.0038	-0.0004	0.0001	0.0015

Table 2 (continued)

[1] This panel reports the descriptive statistics of the variables used in the regression analyses. All variables are scaled by average total assets.

E = Income before extraordinary items (*Compustat* annual item #18)

AR = 12-month buy-and-hold security return beginning four months after the fiscal year end minus the value-weighted return of the comparable size/book-to-market/prior year return portfolio over the same 12-month period. The comparison portfolios are created by first sorting stocks into quintiles based on their capitalization values at the beginning of the year of portfolio formation. NYSE breakpoints are used so that there are an equal number of NYSE stocks in each quintile. Next, within each of the size quintiles, stocks are sorted into quintiles based on their industry-adjusted book-to-market ratios. The book-to-market ratio is defined as the book value at the end of the fiscal year prior to the year of portfolio formation divided by capitalization value at the beginning of the calendar year of portfolio formation. Book-to-market ratios are industry adjusted by subtracting the mean industry book-to-market ratio over the sample period from the individual stock's book-to-market ratio, where industries are defined along two-digit SIC codes. Finally, within the 25 size/book-to-market portfolios, stocks are sorted based on their prior 12-month return ending one month prior to portfolio formation.

TCC = Tax change component of earnings. Computed as $PTE_t(ETR_{t-1} - ETR_t)$.

ATE = Aggregate earnings excluding the tax change component of earnings. Computed as $E_t - TCC_t$.

INTCC = Initial tax change component of earnings. Computed as $PTE_t(ETR_{t-1} - ETRQ1_t)$.

REVTCC = Revised tax change component of earnings. Computed as $PTE_t(ETRQ1_t - ETR_t)$.

Panel C: Industry Composition[1]

	Industry Membership	N	%	Mean *TCC*	Mean *INTCC*	Mean *REVTCC*
1	Mining and Construction	208	2.08	-0.0011	-0.0018	0.0007
2	Food	318	3.18	0.0001	-0.0008	0.0010
3	Textiles, Printing, and Publishing	816	8.17	-0.0002	-0.0009	0.0005
4	Chemicals	381	3.82	-0.0003	-0.0012	0.0009
5	Pharmaceuticals	262	2.62	-0.0006	-0.0017	0.0011
6	Extractive Industries	310	3.10	-0.0024	-0.0026	0.0002
7	Durable Manufacturers	2,389	23.92	-0.0008	-0.0017	0.0009
8	Computers	1,058	10.59	-0.0007	-0.0016	0.0009
9	Transportation	514	5.15	-0.0003	-0.0007	0.0004
10	Retail	1,413	14.15	-0.0004	-0.0008	0.0004
11	Finance, Insurance, and Real Estate	975	9.76	-0.0005	-0.0006	0.0001
12	Personal Services	468	4.69	-0.0008	-0.0013	0.0004
13	Professional Services	359	3.60	-0.0011	-0.0015	0.0004
	Other	515	5.16	-0.0009	-0.0018	0.0009
	Total	9,986	100.00	-0.0006	-0.0013	0.0006

[1] This panel reports the industry composition of the sample and the means of the overall, initial, and revised tax change component of earnings for each industry. The industry breakdown is adapted from Barth, Beaver, Hand, and Landsman (1999) and Rajgopal, Shevlin, and Venkatachalam (2001). Industries are defined according to the following four-digit SIC Codes (in parentheses): Mining and Construction (1000-1999, excluding 1300-1399); Food (2000-2111); Textiles, Printing, and Publishing (2200-2796); Chemicals (2800-2824, 2840-2899); Pharmaceuticals (2830-2836); Extractive Industries (1300-1399, 2900-2999); Durable Manufacturers (3000-3999, excluding 3570-3579 and 3670-3679); Computers (3570-3579, 3670-3679, and 7370-7379); Transportation (4000-4899); Retail (5000-5999); Finance, Insurance, and Real Estate (6141-6799); Personal Services (7000-7999, excluding 7370-7379); Professional Services (8011-8999). See panel A of table 1 for excluded industries.

Table 3
Sample Correlations[1]

	E_{t+1}[2]	TCC_{t+1}	ATE_t	TCC_t	$INTCC_t$	$REVTCC_t$
E_{t+1}		**0.0561**	**0.7746**	**0.0362**	0.1014	**0.0316**
		(0.0000)	**(0.0000)**	**(0.0003)**	(0.3109)	**(0.0016)**
TCC_{t+1}	**0.0752**		-0.0057	**-0.1177**	-0.0135	**-0.1155**
	(0.0000)		(0.5723)	**(0.0000)**	(0.1787)	**(0.0000)**
ATE_t	**0.7471**	**-0.0756**		**0.0375**	-0.0166	**0.0726**
	(0.0000)	**(0.0000)**		**(0.0002)**	(0.0968)	**(0.0000)**
TCC_t	0.0152	**-0.1003**	-0.0044		**0.6740**	**0.3954**
	(0.1289)	**(0.0000)**	(0.6584)		**(0.0000)**	**(0.0000)**
$INTCC_t$	0.0009	-0.0170	**-0.0393**	**0.8405**		**-0.2345**
	(0.9269)	(0.0897)	**(0.0001)**	**(0.0000)**		**(0.0000)**
$REVTCC_t$	**0.0254**	**-0.1485**	**0.0614**	**0.2970**	**-0.2678**	
	(0.0111)	**(0.0000)**	**(0.0000)**	**(0.0000)**	**(0.0000)**	

[1] This table reports Pearson (below the diagonal) and Spearman rank-order correlations (above the diagonal) for the full sample (N = 10,335). The correlation coefficient, followed by a two-sided p-value is reported in each cell. **Bold values** are significant at the 0.05 level or better.
[2] See panel B of table 2 for variable definitions.

Table 4
The Persistence of the Tax Change Component of Earnings[1]

$$TCC_{t+1} = \gamma_0 + \gamma_1 TCC_t + \nu_{t+1} \quad (4)$$

Panel A: Full Sample (N = 9,986)

	Estimate	*Robust SE*[2]	*t-statistic*	*p-value*
γ_0	-0.0005	0.0001	-5.01	0.000
γ_1	-0.1459	0.0209	-6.97	0.000
$\overline{R}^2$	0.0101			

Panel B: ETR Decreases (N = 4,860)

	Estimate	*Robust SE*	*t-statistic*	*p-value*
γ_0	0.0006	0.0002	3.60	0.000
γ_1	-0.5416	0.0691	-7.83	0.000
$\overline{R}^2$	0.0582			

Panel C: ETR Increases (N = 4,978)

	Estimate	*Robust SE*	*t-statistic*	*p-value*
γ_0	0.0005	0.0002	3.42	0.001
γ_1	0.0077	0.0199	0.39	0.700
$\overline{R}^2$	0.0000			

[1] This table reports the results of pooled OLS regressions of the future tax change component of earnings on the current tax change component of earnings. OLS is used rather than a fixed or random effects model. Results from the Breusch-Pagan (1980) LM test ($?^2 = 0.59$, $p = 0.4431$) indicate that OLS is the appropriate estimation method.
[2] Because the data are pooled, I use Huber-White robust standard errors (Rogers 1993, generalizing White 1980), which are robust to heteroskedasticity and serial correlation and correct for dependence within a cluster of related observations.

See panel B of table 2 for variable definitions.

Table 5

The Persistence of the Initial and Revised Tax Change Component of Earnings[1]

$$TCC_{t+1} = d_0 + d_1 INTCC_t + d_2 REVTCC_t + v_{t+1} \quad (5)$$

Panel A: Full Sample (N = 9,986)

	Estimate	*Robust SE*[2]	*t-statistic*	*p-value*
d_0	-0.0002	0.0001	-2.47	0.014
d_1	-0.0897	0.0202	-4.45	0.000
d_2	-0.4263	0.0532	-8.01	0.000
$\overline{R}^2$	0.0255			

H_1:	$d_1 = d_2$
F-statistic:	39.53
p-value:	0.000

[3]

Panel B: ETR Decreases (N = 4,860)

	Estimate	*Robust SE*	*t-statistic*	*p-value*
d_0	0.0007	0.0002	4.05	0.000
d_1	-0.3903	0.0757	-5.16	0.000
d_2	-0.7156	0.0786	-9.11	0.000
$\overline{R}^2$	0.0731			

H_2:	$d_1 = d_2$
F-statistic:	19.33
p-value:	0.000

[4]

[1] This table reports the results of pooled OLS regressions of the future tax change component of earnings on the current initial and revised tax change component of earnings. OLS is used rather than a fixed or random effects model. Results from the Breusch-Pagan (1980) LM test ($?^2 = 0.33$, $p = 0.5651$) indicate that OLS is the appropriate estimation method.

[2] Because the data are pooled, I use Huber-White robust standard errors (Rogers 1993, generalizing White 1980), which are robust to heteroskedasticity and serial correlation and correct for dependence within a cluster of related observations.

[3] H_1: The initial (Q1) estimated annual ETR change is likely to be more persistent for future annual ETR changes than subsequent revisions (Q2, Q3, Q4) in the estimated annual ETR change.

[4] H_2: For firms with *decreases* in annual ETRs, the initial (Q1) estimated annual ETR change is likely to be more persistent for future annual ETR changes than subsequent revisions (Q2, Q3, Q4) in the estimated annual ETR change.

See panel B of table 2 for variable definitions.

Table 6

The Persistence of the Tax Change Component of Earnings for Future Earnings[1]

$$E_{t+1} = d_0 + d_1 ATE_t + d_2 INTCC_t + d_3 REVTCC_t + v_{t+1} \quad (6)$$

Panel A: Full Sample (N = 9,986)

	Estimate	*Robust SE*[2]	*t-statistic*	*p-value*
d_0	0.0167	0.0008	19.80	0.000
d_1	0.8000	0.0108	74.93	0.000
d_2	0.2238	0.0726	3.08	0.002
d_3	-0.1978	0.1260	-1.57	0.117
$\overline{R}^2$	0.5592			

H_3:	$d_2 = d_3$
F-statistic:	12.85
p-value:	0.000

[3]

Panel B: ETR Decreases (N = 4,860)

	Estimate	*Robust SE*	*t-statistic*	*p-value*
d_0	0.0153	0.0012	12.60	0.000
d_1	0.8035	0.0144	55.64	0.000
d_2	0.5363	0.2418	2.22	0.027
d_3	-0.1474	0.2187	-0.67	0.500
$\overline{R}^2$	0.5962			

H_4:	$d_2 = d_3$
F-statistic:	11.69
p-value:	0.000

[4]

[1] This table reports the results of pooled OLS regressions of the future tax change component of earnings on the current initial and revised tax change component of earnings. OLS is used rather than a fixed or random effects model. Results from the Breusch-Pagan (1980) LM test ($?^2 = 0.20$, $p = 0.6571$) indicate that OLS is the appropriate estimation method.

[2] Because the data are pooled, I use Huber-White robust standard errors (Rogers 1993, generalizing White 1980), which are robust to heteroskedasticity and serial correlation and correct for dependence within a cluster of related observations.

[3] H_3: The initial (Q1) estimated annual ETR change is likely to be more persistent for future earnings than subsequent revisions (Q2, Q3, Q4) in the estimated annual ETR change.

[4] H_4: For firms with *decreases* in annual ETRs, the initial (Q1) estimated annual ETR change is likely to be more persistent for future earnings than subsequent revisions (Q2, Q3, Q4) in the estimated annual ETR change.

See panel B of table 2 for variable definitions.

Table 7

Non-linear Generalized Least Squares Estimation of the Pricing of Earnings Components[1]

$$E_{t+1} = d_0 + d_1 ATE_t + d_2 INTCC_t + d_3 REVTCC_t + v_{t+1} \quad (7)$$

$$AR_{t+1} = w_0 + w_1(E_{t+1} - d_0 - d_1^* ATE_t - d_2^* INTCC_t - d_3^* REVTCC_t) + e_{t+1} \quad (8)$$

Panel A: Market Pricing of Earnings Components with Respect to Their Implications for One-Year-Ahead Earnings

Forecasting Coefficients			*Valuation Coefficients*		
Parameter	*Estimate*	*Asymptotic Std. Error*	*Parameter*	*Estimate*	*Asymptotic Std. Error*
d_1	0.8000	0.0071	d_1^*	0.7575	0.0294
d_2	0.2238	0.0577	d_2^*	0.3444	0.2382
d_3	-0.1978	0.1018	d_3^*	-1.2909	0.4226

Test of Market Efficiency:	$d_1 = d_1^*$, $d_2 = d_2^*$, and $d_3 = d_3^*$
Likelihood Ratio Statistic:	10.390
Marginal Significance Level:	0.001

Panel B: Pricing of Individual Earnings Components

	ATE	*INTCC*	*REVTCC*
Test of Market Efficiency:	$d_1 = d_1^*$	$d_2 = d_2^*$	$d_3 = d_3^*$
Likelihood Ratio Statistic:	1.982	0.242	6.772
Marginal Significance Level:	0.159	0.623	0.009

[1] This table reports the estimation results of the Mishkin (1983) framework. The two equations are jointly estimated using an iterative generalized nonlinear least squares estimation procedure based on 9,986 observations during 1994-2000.

See panel B of table 2 for variable definitions.

Table 8

Summary Regression Statistics of the Relation between Abnormal Stock Returns and Scaled Revised Tax Change Component Decile Rankings (Fama and MacBeth 1973 Approach)[1]

$$AR_{t+1} = d_0 + d_1 REVTCC_t^{dec} + x_{t+1} \quad (11)$$

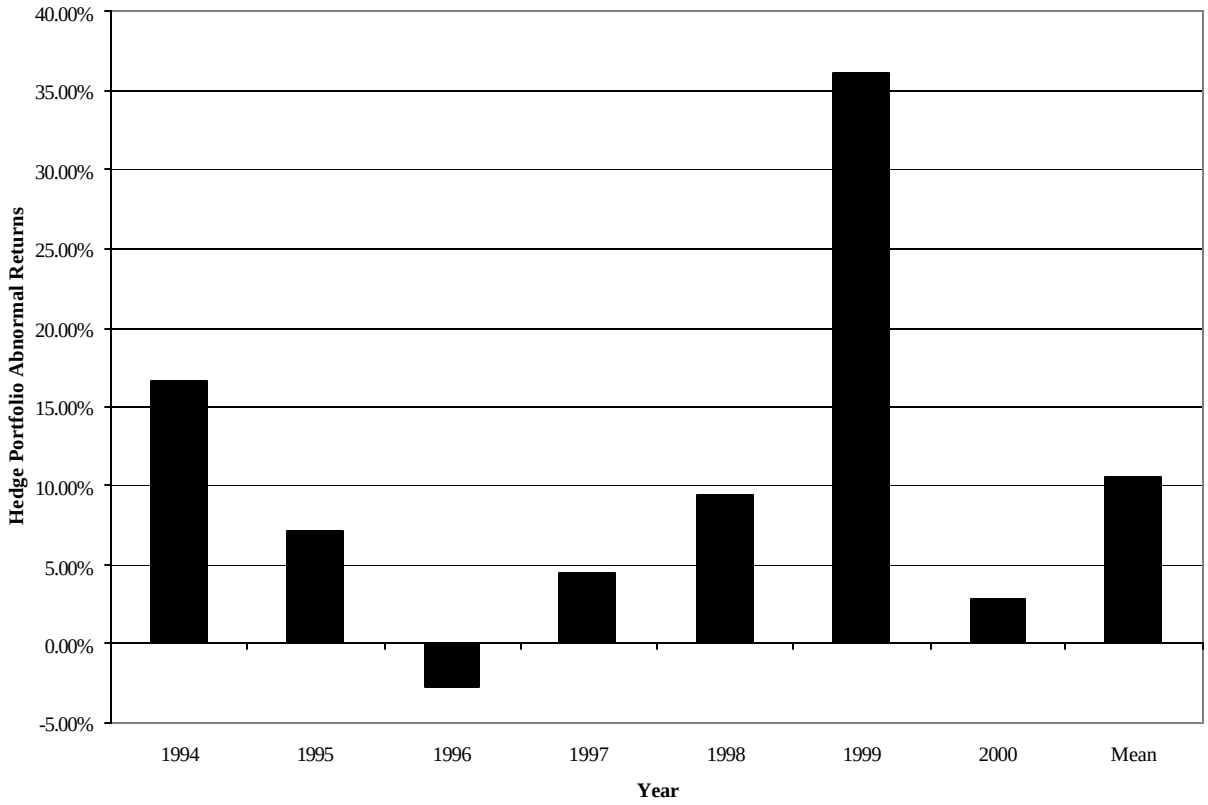
Panel A: Univariate Regressions – Total Period Return

Parameter	*Predicted Sign*	*Means from Annual Regressions (N = 7)*	*Number of Years Positive/(Negative)*
d_0	?	0.0189 (0.8236)	4/(3)
d_1	+	0.1052 (0.0721)	6/(1)

[1] This table presents summary statistics of annual cross-sectional regressions estimated using the Fama and MacBeth approach. Abnormal returns are defined as the 12 month buy-and-hold security return beginning April 1 and ending March 31 minus the value-weighted return of a comparable size/book-to-market/prior year return portfolio over the same period (See table 2 for a description of the comparison portfolio construction). The decile rankings of $REVTCC_t$ are formed as follows: Ten portfolios are formed by first ranking firms on the magnitude of after-tax earnings, excluding the tax change. Then, within each of the ten portfolios, firms are sorted evenly into deciles based on the revised tax change component of earnings. The long position consists of firms within the highest decile of the revised tax change component of earnings, and the short position consists of firms in the lowest decile of the revised tax change component of earnings. In order for the regression coefficients to be interpreted as zero-investment portfolio returns, the returns used in the regressions must be for the same time period and the accounting information used to create the hedge portfolios must coincide chronologically and be publicly available at the time of portfolio formation. Thus, I estimate equation (11) using firms with December year-ends only, which results in a sample size of 4,747 firm-year observations.

Figure 1

Abnormal Returns to a Calendar Year Hedge Portfolio Formed on the Revised Tax Change Component of Earnings[1]



[1] This figure reports the calendar year abnormal returns to a hedge portfolio formed by taking a long position in firms with large increases in the revised tax change component of earnings and an equal-sized short position in firms with large decreases in the revised tax change component of earnings. Abnormal returns are defined as the 12 month buy-and-hold security return beginning April 1 and ending March 31 minus the value-weighted return of a comparable size/book-to-market/prior year return portfolio over the same period (See table 2 for a description of the comparison portfolio construction). The calendar year is the year in which the portfolio is formed (e.g., for 1994, the revised tax change component is used to form the long and short position of the hedge portfolio and abnormal returns are then measured for the 12-month period beginning April 1, 1995 and ending March 31, 1996). Ten portfolios are formed by first ranking firms on the magnitude of after-tax earnings, excluding the tax change. Then, within each of the ten portfolios, firms are sorted evenly into deciles based on the revised tax change component of earnings. The long position consists of firms within the highest decile of the revised tax change component of earnings, and the short position consists of firms in the lowest decile of the revised tax change component of earnings.