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# Large book-tax differences: Alternative Perspective

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# Large book-tax differences: Alternative perspectives

by

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# Abstract

In this dissertation I investigate the information properties of the accounting construct known as book tax difference (BTD). I relate BTDs to various features and characteristics of firms, such as earnings persistence,[1] sales changes, business expenditures, and corporate asset structure. I specifically examine large temporary differences between book income and taxable income that have not been studied in full regarding their available information content. Because BTDs represent differences between two reporting systems, my emphasis is on the information obtained because of the unique properties of the two measures of earnings obtained by applying U.S. GAAP and the U.S. tax code.

Understanding the relationship between current and future earnings and the pricing of future earnings is an ongoing question of interest in financial accounting. The inability of users to rely on current financial reports to forecast the sustainability of income has pushed investors and policymakers to pursue alternative sources of information to assess the quality level of earnings. For this reason, I examine the time series relation between current and one-year-ahead earnings, also referred to as earnings persistence, which is a primary measure of earnings quality. I apply an autoregressive model of PTBI in period t+1 on PTBI in period t and examine how sales change, managerial ability, and long-term investment in physical and intangible assets interact with large BTDs and pre-tax book income (PTBI).

The foundation of my thesis is based on work by Hanlon (2005) and Blaylock et al. (2012) in the tax and earnings persistence literature and Kothari, Laguerre, and Leone (2002) and Amir, Guan, and Livne (2007) papers in the earnings growth literature. Following Hanlon's (2005)

[1] Earnings persistence measures the extent to which current earnings persist or recur in the future. High persistence indicates a sustainable earnings generation process that is particularly valued by investors.

specification as the basis for my main empirical model, I built upon this line of accounting research. The first chapter is a comprehensive introduction to the literature and the dominant theory of the thesis. In the second chapter, I investigate how downturns in sales are associated with lower earnings persistence when there are large negative or large positive BTDs. Earnings persistence following a sales decline is incrementally lower when firms exhibit large negative or positive book tax differences. I argue that lower earnings persistence occurs when sales declines are accompanied by disruptive changes in operations, reflected in asset write-downs, goodwill impairments, and other special items resulting in large negative book tax differences. Thus, I help to explain the previously unexplained finding in Hanlon (2005) that firm-years with large negative book tax differences have lower earnings persistence.

In the third chapter, I adopt another approach to examining why large positive and large negative book tax differences (LPBTDs and LNBTDs) are associated with lower earnings persistence (Hanlon, 2005). Specifically, I investigate whether lower earnings persistence of LPBTDs and LNBTDs, relative to smaller BTDs, is due to earnings management or to uncertainty about investment outcomes. I first show that high CAPX (HiCAPX) firms and high R&D (HiR&D) firms are disproportionately represented in the LPBTD and LNBTD sub-samples, respectively. In contrast, high discretionary accrual (HiDA) firms are uniformly distributed across the LPBTD, LNBTD and smaller BTD sub-samples. Next, I find that HiDA firms are associated with lower earnings persistence in all BTD sub-samples uniformly, but HiCAPX and HiR&D firms are only associated with lower earnings persistence in the LPBTD and LNBTD sub-samples, respectively. Finally, extending the Hanlon (2005) model, I demonstrate that the differential earnings persistence associated with LPBTDs and LNBTDs is concentrated in HiCAPX and HiR&D firms, respectively.

In the fourth chapter, I look at multiple characteristics of LNBTD firm-year observations to examine different explanations why LNBTDs occur. First, I show the data does not support common misconceptions about large negative BTDs representing financially distressed companies or post-maturity companies in shake-out or decline stages. Second, I develop an alternative hypothesis that firms enter LNBTD status temporarily as part of innovation cycles. Third, I provide contextual evidence that supports this alternative hypothesis. I demonstrate that LNBTD firms are more likely to be firms with high levels of managerial ability and strategic investment.[2]

[2] High managerial ability is the decile-ranked measure of managerial ability developed by Demerjian et al. (2012)

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# CHAPTER ONE

# I. Introduction

Numerous researchers have drawn attention to the gap between reported financial earnings and taxable income, which has increased since the 1990s (Desai 2003; Mills et al. 2001; Manzon and Plesko 2001). Accounting studies have documented the association between book tax differences and future performance of firms. For example, Lev and Nissim (2004) and Hanlon (2005) study the information properties of BTDs with respect to persistence, growth, and quality of pre-tax book income. Lev and Nissim (2004) use the tax to book ratio, arguing that the fundamental construct reflects all three components: pre-tax discretionary accruals, discretionary tax accruals, and nondeductible pre-tax accruals.

Hanlon (2005) investigates earnings, accruals, and cash flow persistence for firms with large positive and negative book tax differences. Earnings persistence in the context of her study is defined as the slope coefficient in the auto regressive regression between current and future pretax earnings. Hanlon's results indicate that the presence of large BTDs, regardless of their direction, is associated with lower earnings persistence. She argues that the reduction in persistence associated with large positive book tax differences is consistent with large book tax differences indicating lower earnings quality.

Blaylock et al. (2012) study the role of large positive book tax differences in reducing earnings persistence. Their study finds that book tax differences that arise from earnings management, as opposed to tax avoidance, reduce earnings persistence. By controlling for GAAP changes, macroeconomic conditions, and earnings management, Seidman (2010)

provides evidence on the quality of the book tax income gap as a proxy for earnings management or tax aggressiveness.

## I.I. Earnings Literature

Understanding the relationship between current and future earnings and the pricing of future earnings is an ongoing question in financial accounting. The inability of users to rely on current financial reports to forecast the sustainability of income has pushed investors and policymakers to pursue alternative sources of information about the quality of earnings. Dechow, Ge, and Schrand's (2010) in-depth and comprehensive literature review on the determinants, consequences, and proxies for earnings quality finds no general objective definition of earnings quality since "quality" is defined differently based on the decision context.

Within my research context, the quality of an earnings number depends on how informative it is about firm financial performance, many aspects of which are unobservable. Higher quality earnings provide more information about the features of a firm's financial performance relevant to a specific decision made by a particular decision-maker. Thus, earnings quality is informative in terms of the information asymmetry between internal and external parties regarding financial performance. Earnings quality is determined by relevant financial performance and the accounting system's ability to record this performance. This statement implies quality should be evaluated based on value-relevant information decisions and should not be constrained by its usefulness for market valuation (Dechow et al., 2010).

Below, I name the principal determinants and consequences of earnings quality based on the review study by Dechow et al. (2010). There are six determinants: (1) firm characteristics, (2) financial reporting practices, (3) governance and controls, (4) auditors, (5) equity market incentives, and (6) external factors. The first category, firm characteristics, is of interest to my

thesis. Three specific firm characteristics, (1) firm performance, (2) debt, (3) growth and investment, are prominent here. There are nine categories regarding the consequences of earnings quality:

- Litigation propensity
- Audit opinions
- Market valuations
- Real activities, including disclosure
- Executive compensation
- Labor market outcomes
- A firm's cost of equity capital
- A firm's cost of debt capital
- Analyst forecast accuracy

Finally, there are three empirical proxies often used to measure earnings quality: earnings persistence,[3] investor responsiveness to earnings, and external indicators of earnings misstatements. For the purposes of my dissertation study, I apply the first one, earnings persistence, as my primary earnings quality measure.

***On Discretionary Accruals***

Earnings management happens either through accruals-based managerial decisions (accounting practice) or cash-based real earning management of operating cash flows. However, accrual actions are less costly to implement than managing cash flows from operations.

It is common in the accounting literature to detect earnings management through accrual measures based on a manager's discretionary actions. For example, Jones (1991) develops a

[3] Auto correlation between current and next period earnings time series regression. Earnings persistence measures the extent to which current earnings persist or recur in the future. High persistence indicates a sustainable earnings generation process that is particularly valued by investors.

proxy for earnings management by regressing total accruals on factors reflecting changes in a firm's economic environment and identifies the equation remainder, the residual, as the estimate for discretionary non-normal accruals. Dechow et al. (1995) modify the Jones model to allow for the possibility that managers use discretion to accrue revenues when it is questionable whether revenue recognition criteria have been met. Healy (1996) simply uses total accruals to proxy for abnormal discretionary accruals.

The results in Guay, Kothari & Watts (1996) find that only the Jones and modified Jones models produce abnormal accruals that are relatively accurate and significantly different from a random sample of earnings and thus consistent with abnormal accruals resulting from managerial decisions to increase or meet/beat income. Dechow et al. (1995) also test five accrual models and their accuracy and power to detect earnings management. Their study finds that the modified Jones model is the most powerful in detecting earnings management in their study sample. Interestingly, Dechow and Dichev (2002) argue that accruals quality is a powerful indicator of earnings persistence and does not necessarily show earnings management but may pick up other firm-specific characteristics. Other researchers have used other distinct measures as proxies for "earnings quality," including earnings smoothness, timeliness, loss avoidance, investor responsiveness, and external indicators such as restatements and SEC enforcement releases (Dechow et al. 2010, Jackson 2018).

***On the Accruals Anomaly***

Both persistence and investment information in accruals vary cross-sectional depending on the firm's business model and environment (Zhang 2007). Zhang (2007) makes and tests two arguments: Under the investment argument, Zhang (2007) states, accruals capture fundamental investment in working capital, which is associated with the growth attributes of the firm. The

investment/growth information in accruals predicts future stock returns. Under the persistence argument, accruals, as a component of earnings, are less persistent than cash flows, and investors misestimate accruals' persistence. The lower persistence of accruals relative to cash flows explains future returns. The Zhang (2007) rational investment argument offers a different prediction from persistence for future earnings: accruals numbers capture essential information about corporate investment decisions. If the investment is optimal, on average, then high accruals signify higher earnings in the future. Based on the investment argument, the correlation between positive earnings growth and accruals is stronger when accruals capture investment-relevant information.

On the other hand, the persistence hypothesis suggests high accruals lead to lower subsequent earnings. Moreover, the negative earnings growth and accruals association is more robust when accruals are less persistent relative to cash flows. Sloan (1996) claims that the explanation for the lower persistence of the accruals component is because of measurement error with current accounting systems, either because of how accounting reflects actual performance or because of the discretion allowed in the accounting system.

Other studies, such as Fairfield, Whisenant & Yohn (2003a), argue that diminishing marginal economic return on investment (ROI) triggers this persistence drop. They claim that the lower persistence of accruals is related to actual performance and, in particular, growth as an element of total performance. As industries expand, it is more challenging to maintain the same sales pace, affecting profit margins. They demonstrate how the change in PP&E has similar implications for earnings persistence as working capital accruals, evidence of growth creating lower accruals persistence.

## I.II. Book Tax Difference Literature

Starting from the 1990s, the financial and taxable income of companies have gone on diverging paths. This trend has long concerned the market. There is an ongoing debate between researchers regarding book and tax income convergence versus divergence. As a result, two research camps on the book tax trade-off have emerged, the convergence (BTC) and the divergence (BTD) camps. Whether divergence is an outcome of manipulative managerial activity (earnings management and tax avoidance) or a consequence of market-level or firm-level events is a question yet unanswered. A survey by Cloyd, Pratt and Stock (1996) found that (widely-held) public firms cared relatively more about reported financial income and less about taxes. The survey also found that managers of public firms are less likely to choose conformity between financial and tax reporting (BTC) compared to managers of private firms, presumably because widely-held public firms face higher levels of financial reporting costs. By the same token, Wolfson (1993) provides evidence that the "financial reporting consequences of tax planning strategies are relatively less important where business ownership is concentrated in the hands of relatively few investors".

### *On BTD Information Content*

Based on the earnings quality definition, financial reporting becomes more informative when bench-marked against its taxable counterpart. The information content of BTDs is more potent for observations with considerable differences. The underlying logic for using BTDs to infer information is that there are more constraints and less discretion on the side of taxable income. GAAP accounting methods provide managers flexibility in their accounting procedures and use of various estimates (Watts and Zimmerman 1986). On the other hand, the significant accruals quality difference between small BTD observations and large BTD subsets provides

more value-relevant information about the firm's management and performance. Many papers have studied the book tax difference information in relation to credit ratings, conservatism, corporate tax shelters, stock market reactions, and even financial distress. A missing piece in the large BTD information content literature is the accounting components creating these large negative and positive book tax differences.

The literature consensus is that BTDs can arise from several different sources, including the discrepancy in tax and accounting standards, tax avoidance and upwards earnings management (Hanlon 2005; Lev and Nissim 2004; Blaylock et al. 2012). While older studies offer potential explanations, they lack a proper economic framework as to why the information content in BTDs provides information about future profitability, growth and investment. BTDs give information on the extent to which firms reduce taxable income to avoid taxes. Mills (1998) supports the tax avoidance argument by providing evidence that firms with large book tax differences have a significantly larger tax audit likelihood by the Internal Revenue Service. Desai (2003) and Desai and Dharmapala (2006) argue that larger BTDs indicate aggressive tax planning such as sheltering activities. Wilson (2009) suggests that large positive temporary BTDs signal aggressive tax planning. excessive and aggressive tax strategies cannot be sustained in the long term, consistent with lower earnings persistence documented in the literature.

Despite the large amount of research dedicated to studying the relation between BTDs and these various managerial and financial accounting concepts, little work has been done towards finding the different sources of large temporary BTDs, constraining the ability to analyze and explain these phenomena. The answer to the question: "What are the main drivers of large positive (negative) book tax differences?" can implicitly solve many puzzles and inquiries in this

field of study. Thus, unraveling the determining factors of BTDs becomes a priority in my thesis study.

Temporary differences eventually reverse themselves in the long run. Some transactions and expenses are recognized by both financial accounting and tax accounting methods, but at different times, causing temporary differences between book and tax income from this timing mismatch. Permanent tax differences never reverse, only impacting the current period. The effect of temporary differences on the firm's financial and tax reporting, however, is more complex.

***The Earnings BTD Literature***

Investigation of earnings management through the book tax difference perspective advanced with the Philips, Pincus and Rego (2003) and Philips, Pincus, Rego and Wan (2004) studies. They advanced this research by asking whether the information content provided by deferred tax expenses, which contain the same information as book tax timing differences, provides any incrementally valuable evidence towards the understanding of earnings management. The simple basis for this question is the discrepancy under GAAP accounting and tax accounting principles regarding income recognition. Managers are given more discretionary power over how to record and report their earnings under the financial reporting rules than the tax rules, which follow tax authority protocols and procedures. Assuming managers take advantage of this opportunity and inflate their earnings upwards, keeping taxable income constant, such earnings management behavior will generate book tax differences. Their findings provide evidence congruent with their hypothesis.

The foundation of Philips et al. (2003)’s earnings management theory is built on Burgstahler and Dichev (1997) and Mills and Newberry (2001). This literature evaluates whether deferred

tax expenses are informative in identifying three earnings management targets. Managers are reluctant to reporting an earnings decline or a loss, so one target is previous year income and another target is break-even. Meeting analysts' earnings forecasts is a third earnings reporting target for managers.

The Hanlon (2005) paper was a turning point in this field of accounting research. Hanlon (2005) investigates earnings, accruals, and cash flow persistence for firms with large positive and negative book tax differences. Her results suggest that the presence of large BTDs, regardless of their direction, decreases persistence. She argues that the reduction in persistence caused by large positive book tax differences is consistent with positive book tax differences indicating lower earnings quality. She also contends that large positive book tax differences result from income-increasing accrual choices that are not similarly reflected for tax purposes. Such accruals must reverse in the future, resulting in less persistent earnings and accruals for firms with large book tax differences. To test her hypotheses, she investigates firms with large positive and negative book tax differences and finds that earnings, accruals, and cash flows are less persistent for such firms. She posits that the reduced earnings persistence for firm-year observations with large positive book tax differences can be explained by lower earnings quality when book income far exceeds taxable income. Her results also indicate that large negative book tax differences relate to lower earnings persistence, and she argues that these results are again likely the result of earnings management. Subsequent papers attempt to explain the source of the relationship between book tax differences and earnings persistence.

Wilson (2009) suggests that large positive temporary BTDs signal aggressive tax planning. But aggressive tax strategies cannot be sustained in the long term, consistent with lower earnings persistence documented in the literature. Other research looks for alternative explanations.

Seidman (2010) provides evidence that variation in book tax differences can be explained by changes in GAAP and general macroeconomic conditions. He also finds that GAAP changes and earnings management contribute to decreased earnings persistence for firms with large book tax differences. Guenther (2011) identifies a small subset of influential observations that appear to explain Hanlon (2005) results. Analysis of these meaningful observations suggests that the relationship between earnings persistence and large book tax differences is driven by young firms, small firms, firms with a high return on assets, and firms with large transitory items. The Blaylock et al. (2012) study focuses on explaining the origins of the link between large positive book tax differences and earnings persistence and find evidence consistent with earnings management being the driving force of this relationship.

Erickson, Hanlon & Maydew (2004) found managers engaged in fraudulent financial reporting paid an additional eight cents in taxes to report each additional dollar of fraudulent earnings, confirming a trade-off between reported income and taxable savings. Lennox, Lisowsky, and Pittman (2013) document that U.S. public firms engaging in tax aggressiveness are less likely to be involved in accounting fraud, evidence of a managerial trade-off between earnings and tax agendas. This strand of the literature may yield important insights into the factors associated with earnings persistence.

Drake's (2012) doctoral thesis attempts to explain why the book tax difference variable is informative regarding earnings persistence by incorporating life cycle theory. She finds that book tax differences vary predictably over a firm's life cycle because firms engage in different types of activities at each stage. She also provides evidence that the relationship between large book tax differences and earnings persistence is explained by life cycle. Using Dickinson's (2011) method of identifying life cycle using cash flows to group firm-year observations into life cycle stages,

Drake (2012) suggests that the tax information in financial statements is informative because the book tax income relation captures company life-cycle information.

The overriding consensus in the literature is that lower earnings persistence associated with high book tax differences is a negative outcome of discretionary accruals, boosting earnings upwards or managing earnings downward, depending on the manager's objectives.

## I.III. Dissertation Summary

I begin my study by following two main articles in this field, Hanlon (2005) and Blaylock et al. (2012). The two papers are interested in earnings management information within the large book tax difference distributions coming from discretionary behavior and earnings characteristics. The central aspect of interest here is the information content of large BTDs concerning earnings persistence and earnings growth. Based on prior accounting and tax literature, Hanlon focuses on large negative and positive BTD subsets, claiming the additional reporting and income recognition standards provide researchers with an enriched source for archival academic-level research. The lower discretion and higher regulation required by tax authorities compared to financial accounting standards create a discrepancy, generating an informative package known as the book tax difference variable.

To ensure I am on the same track in my data sample, I follow Hanlon's and Blaylock et al.'s sample selection procedure. Then I replicate the Hanlon (2005) base earnings persistence models. I find comparable initial results in my empirical replications; the Hanlon (2005) earnings persistence model is the basic model for the empirical models I develop. By studying the empirical and statistical results of my various persistence expansion models, I discover potential alternative sources of persistence behavior besides tax avoidance or earnings management. In the next three chapters, I expand the basic Hanlon model by adding variables of interest. I interact discretionary

accruals, tax avoidance, sales down, capital expenditure, R&D expenditure, managerial ability and SG&A with the PTBI-BTD interaction term to explore the origins of lower earnings persistence.

The earnings management hypothesis (Hanlon's EM argument) argues that the large BTD creation process reduces earnings and accruals persistence due to the subsequent reversal of accruals. However, the reversal argument is not supported in the case of growth companies. Allen, Larson & Sloan (2013) have reported that accruals generated from firm growth are less persistent than cash flows. The pricing of accruals is driven by a combination of accruals estimation error and firm growth (see Allen et al., 2013). Likewise, Fairfield et al. (2003) and Desai et al. (2004) argue that the accrual anomaly is related to firm growth factors, mainly capital (CAPX) and research (R&D) investment. On the other hand, the Richardson, Sloan, Soliman & Tuna (2006) paper disputes this claim and attributes the accrual anomaly to accrual accounting distortion and accounting estimation errors.

In my first research paper (chapter II), I study the impact of changes in sales on the earnings persistence BTD interaction terms. In my second study (chapter III) I examine the relation between R&D and capital expenditure and the earnings persistence BTD interaction terms. More distinctively, I re-examine the question why large positive and large negative book tax differences (LPBTDs and LNBTDs) are associated with lower earnings persistence (Hanlon, 2005). Specifically, I investigate whether lower earnings persistence of LPBTD firms and LNBTD firms, relative to firms in the middle BTD quintiles, is due to earnings management or is a consequence of high levels of investment expenditures. First, I find that HiDA firms are associated with lower earnings persistence in all BTD quintiles, but HiCAPX and HiR&D firms are only associated with lower earnings persistence in the LPBTD and LNBTD quintiles respectively. Extending the Hanlon

(2005) model, I demonstrate that the differential earnings persistence associated with LPBTDs (LNBTDs) comes from the intersection of HiCAPX (HiR&D) and LPBTD (LNBTD) firms.

In the third and final thesis paper (chapter IV) I focus on the large negative BTD phenomenon. I investigate the characteristics and properties of large negative book tax differences (LNBTDs). I perform a variety of tests to examine alternative explanations. I find that LNBTD firms, on average, have higher financial performance and efficiency, are less likely to be in financial difficulty, are characterized by higher levels of R&D and SG&A expenditures, as evidence of innovation and technology, and are managed by more capable managers. Thus, my analysis supports an alternative hypothesis that the properties of LNBTD observations result from risky strategic engagement.

The results from the three studies contribute to a collective understanding of the role of large book tax differences as information variables. The importance of managerial capabilities and expertise in making effective use of strategic assets and resources to improve firm efficiency and long-term growth is discussed comprehensively. Identifying the factors and variables that create large positive (negative) BTDs, and their impact on earnings persistence may improve the quality of financial analyst reports and investor decision making regarding debt and equity financing. This may in turn affect financial performance, rates of return, balance sheet liquidity and solvency in relation to firm and product life cycles.

# CHAPTER TWO

# II. Book Tax Differences and Earnings Persistence: Alternative Theories

**ABSTRACT:** Tax research that investigates the association between book tax differences (BTDs) and short-term earnings persistence identifies accruals-based earnings management (EM) as a reason why large BTDs are associated with lower earnings persistence. The EM theory is based on the premise that large BTDs occur when managers take advantage of the greater flexibility permitted by accounting rules versus tax rules to manage earnings. Under the EM theory, earnings persistence is reduced because the accruals used to manage book income relative to tax income must reverse in the short term. I describe an alternative theory, that large BTDs reflect operating circumstances, and I predict that lower persistence of earnings results from disruptions in operating income that are manifest when sales decline. Unlike earnings management theory, the alternative proposition pertains to earnings persistence associated with cash flows as well as accruals. I find that the lower earnings persistence of firms with large positive and large negative BTDs is stronger when sales decline and that this lower persistence emanates from both cash flows and accruals.

## II.I. Introduction

The question why large positive and large negative book tax differences (BTDs) are informative about short-term persistence of earnings has not been fully answered in the tax literature (Hanlon and Heitzman 2010). Previous research, that follows a financial accounting paradigm, has focused on earnings management through accruals to explain the lower persistence of one-year-ahead earnings associated with large positive book tax differences (LPBTDs) and has paid less attention to large negative book tax differences (LNBTDs) (Hanlon 2005, Blaylock et al. 2012). I propose an alternative argument why firms that have large positive or large negative BTDs have lower earnings persistence on average than other firms. I argue that large positive and large negative BTDs are associated with high operating uncertainty and competitive pressure because they are transitory states associated with growth and instability. For firms operating under these conditions, sales declines are particularly salient because a sales decline represents a business disruption that affects the time series properties of earnings. My findings indicate that sales declines provide an important key to understanding the relations between large BTDs and earnings persistence. Reductions in persistence of pre-tax book income associated with LPBTDs and LNBTDs are much larger when sales decrease than when sales increase. The reduction in earnings persistence attributable to cash flows is greater for both LPBTDs and LNBTDs when sales decrease than when sales increase. Moreover, the reduction in earnings persistence attributable to accruals is only observed for both types of BTDs when sales decrease.[4]

Book tax differences represent differences between income recognized for financial reporting purposes and income computed for tax purposes. The literature on BTDs primarily addresses timing differences – differences in the periods when certain items are recognized for book

[4] Regarding the SU vs. SD identification the Literature does not discriminate based on the magnitude of changes in Sales. However, the Ciftci and Zoubi (2019) study suggests otherwise.

purposes and when they are recognized for tax purposes – as opposed to permanent differences. Adopting a financial reporting paradigm, the tax literature suggests that BTDs are informative about earnings management (EM) because managers have greater flexibility to adjust book income than tax income. Moreover, managers typically have incentives to manage book earnings up and taxable income down. Earnings management predicts that earnings persistence will be lower for LPBTDs because high positive book tax differences indicate income-increasing accruals that must reverse in the near future. The EM explanation for lower earning persistence is supported by Hanlon (2005) who documents that a significant part of the reduction in earnings persistence associated with LPBTDs and LNBTDs comes through accruals, and is further supported by Blaylock et al. (2012) who discriminate between EM and tax avoidance as sources of reduced earnings persistence for LPBTDs.

When sales are declining, managers must ascertain the causes of the decline and take steps to reverse it or to reduce costs to remain profitable at lower levels of activity. The management accounting literature has addressed different types of actions that managers take when facing sales-down situations (Anderson, Banker and Janakiraman 2003; Banker and Chen 2006; Banker,and Mehta 2015; Banker, Basu, and Byzalov 2016). In particular, managers curtail some lines of business by closing factories or shops and by reducing headcount. They make changes to product offerings to address shortcomings and they reorganize operations to improve efficiency. Even when a sales decline is due to general economic or industry conditions as opposed to firm-specific concerns, it engenders corporate actions to remove less productive units and improve operating capabilities. Thus, I predict that changes in operations resulting from loss in demand (sales down or SD) reduce earnings persistence. This prediction holds whether the BTD is positive or negative.

The tax literature has predominantly been concerned with accruals-based EM because BTDs reflect timing differences in recognizing items for book versus tax purposes. In this regard, the objective in much of the literature has been to link managerial actions that affect BTDs, such as earnings management, to earnings persistence. Because the EM predictions apply mainly to financial reporting as opposed to operations management, they are more directly related to accruals rather than cash flows. The EM arguments are not applied to real earnings management (Roychowdhury 2006) because REM typically affects both book and tax income.

A different approach to investigating how large BTDs are related to earnings persistence would consider whether factors that lead to large BTDs are relevant in combination with other changes that affect earnings persistence. Drake (2012) relates large BTDs to life-cycle stages based largely on the argument that capital expenditures and disposals that drive timing differences related to depreciation vary across life-cycle stages. Depreciation is an important component of BTDs that is likely to influence the sorting of firms into LPBTDs and LNBTDs (Poterba, Rao, and Seidman 2011). Growth firms (high capital expenditures) are more likely to have LPBTDs and decline firms (low capital expenditures including disposals) are more likely to have LNBTDs than other firms.[5] Growth firms are subject to uncertainty and competitive pressures that may radically alter the complexion of their markets. Therefore, a reduction in sales for growth firms is likely to cause greater disruption and repositioning than for more mature firms. Decline firms are also sensitive to changing market conditions and such firms are likely to discontinue some of their operations as specific markets deteriorate. Thus, the combination of SD and large BTDs in either direction may be informative about changes in operations that affect short-term earnings persistence.

[5] Growth and decline stages are transitory meaning that firms may go in and out of these stages.

To evaluate the predictions based on the alternative theories, I discriminate across four situations – LPBTD and sales-down, LPBTD and sales-up, LNBTD and sales-down and LNBTD and sales-up. EM predicts a negative relation between LPBTD and earnings persistence in both the sales-down and sales-up situations.[6] The operations conjecture predicts a negative relation between both LPBTD and LNBTD and earnings persistence when sales are down. To summarize: (1) both explanations predict lower earnings persistence associated with LPBTD when sales are down, (2) only EM predicts lower persistence associated with LPBTD when sales are up, (3) only operations predicts lower persistence associated with LNBTD when sales are down, and (4) neither predicts lower persistence associated with LNBTD when sales are up.

I estimate models of short-term persistence of pre-tax book income (PTBI) similar to those used previously in the tax and earnings management literature (Hanlon 2005; Blaylock et al. 2012) and find: (1) a large reduction in earnings persistence associated with LPBTD when sales are down, (2) a small reduction in earnings persistence associated with LPBTD when sales are up, (3) a large reduction in earnings persistence associated with LNBTD when sales are down, and (4) a small reduction in earnings persistence associated with LNBTD when sales are up. Both arguments are supported by (1), the tax story is only weakly supported by (2), the operations argument is strongly supported by (3), and neither is supported by (4). Thus, my analysis of the persistence of PTBI favors the operations argument rather than earnings management.

Hanlon (2005) separates the effects of BTDs on persistence of PTBI between cash flows and accruals and finds that the lower persistence effects for LPBTDs and LNBTDs are significant for both cash flows and accruals. As noted above, EM addresses persistence of accruals. Under the operations proposition, changes to the business spawned by sales declines cause discontinuities in

[6] Earnings changes that lead to earnings management may occur whether sales are increasing or decreasing. There is a possibility that upwards earnings management is more prevalent in sales-down situations but this has not been evaluated empirically in the literature.

the earnings stream that may be manifest in the short-term persistence of both cash flows and accruals. In addition to a general reduction in earnings persistence that affects both cash flows and accruals, there are various ways that management responses to a decline in sales may specifically affect accruals. When a company anticipates a drop in demand for its products or services, it will cut capital expenditures. Such cuts will reduce the persistence of depreciation accruals because depreciation of new assets won't replace depreciation of old assets. In addition, write-downs of assets made in relation to a drop in demand would cause a disruption in accruals that would be particularly strong for newer assets with high book values. Similarly, impairments of intangible assets would impact accruals. Other special charges made as businesses are restructured would impact both cash flows and accruals. Moreover, disposals of assets impact both cash flows and accruals. Many of these actions would also affect BTDs in ways that increase the likelihood that firms that are experiencing disruptions are classified as LNBTDs.[7]

As Hanlon (2005) does, I extend my analysis by separating the persistence effects on pre-tax book income into cash flows and accruals. The interactions between sales-down and both LPBTDs and LNBTDs are particularly revealing. There are small to moderate reductions in persistence of PTBI associated with LPBTDs and LNBTDs when sales increase. There are much larger reductions in persistence of PTBI associated with cash flows for both LPBTDs and LNBTDs when sales decrease. More striking, there are no reductions in persistence of PTBI associated with accruals for either LPBTDs or LNBTDs when sales increase, but there are large reductions in persistence of PTBI for both LPBTDs and LNBTDs when sales decrease.

In summary, my analysis bridges the tax and management accounting literatures by empirically evaluating how the persistence of pre-tax book income is differentially related to

[7] Write-downs affect book but not tax (reducing BTDs) whereas disposals may have differential affects on book and tax causing BTDs to increase.

LPBTDs and LNBTDs in sales-up and sales-down situations. I document that the operations argument for reduced persistence due to changes in operations resulting from declines in sales is incrementally and differentiable informative relative to the EM proposition that is more closely aligned with the financial reporting literature.

The remainder of this paper proceeds as follows. Previous literature relevant to this study is reviewed in section 2. Empirical hypotheses are stated in section 3. The data and empirical models are described in section 4. Results of estimating the models are presented and discussed in section 5. Implications of this study are described in section 6.

## II.II. Previous literature

### *Book tax differences*

Understanding the relation between current and future earnings and the pricing of future earnings is an ongoing question in financial accounting. The inability of users to rely on current financial reports to forecast the sustainability of income has pushed investors and policymakers to pursue alternative sources of information for the quality level of earnings. Numerous researchers have drawn attention to the gap between financial earnings and taxable income, which has increased since the 1990s (Desai 2002; Mills, Newberry & Trautman 2002; Manzon and Plesko 2002). The underlying logic of using BTDs to infer information is that there are more constraints and less discretion on the side of taxable income. GAAP accounting methods provide managers flexibility in their choice of accounting procedures and use of various estimates (Watts and Zimmerman 1986).

It should be noted that BTDs can be permanent or temporary. Permanent differences are included in the computation of income for either tax or financial reporting, but never in both. Temporary differences represent timing differences between the two reporting systems. They result from differences between the book-basis balance sheet accounts and the corresponding tax-basis

balance sheet accounts. Temporary differences arise because, for financial reporting, revenue is recognized when earned and expenses are either matched to revenue or spent in the period they are incurred, whereas, for tax purposes, revenue may be recorded when cash is received and expenses are typically recognized when cash is paid. Poterba, Rao and Seidman (2011) provide detailed information about the composition of BTDs, noting that temporary differences related to depreciation are the largest contributors to deferred tax liabilities.

One research stream asserts that BTDs provide information about the extent to which firms reduce taxable income to avoid taxes. Mills (1998) supports the tax avoidance argument by providing evidence that firms with large book tax differences are more likely to be audited by the Internal Revenue Service. Desai (2003) and Desai and Dharmapala (2006) argue that larger BTDs are indicative of tax aggressive planning such as sheltering activities.

Another research stream documents associations between book tax differences and future performance of firms. Lev and Nissim (2004) and Hanlon (2005) study the information properties of BTDs with respect to the predictability, persistence, growth and quality of pre-tax book income. Lev and Nissim (2004) use the tax to book ratio, their logic being that construction of the comprehensive tax fundamental reflects all three components, pretax discretionary accruals, discretionary tax accruals, and nondeductible pretax accruals. Hanlon (2005) investigates earnings, accruals, and cash flow persistence for firms with large positive and negative book tax differences. Her results suggest that the presence of large BTDs, regardless of their direction, decreases persistence. She argues that the reduction in persistence caused by the presence of large positive book tax differences is consistent with positive book tax differences indicating lower earnings quality.

Blaylock et al. (2012) focus on explaining the role of large positive book tax differences in reducing earnings persistence and find that book tax differences that arise from earnings management, as opposed to tax avoidance, reduce earnings persistence. By controlling for GAAP changes, macroeconomic conditions, and earnings management, Seidman (2010) provides evidence on the quality of book tax income gap as a proxy for earnings management or tax aggressiveness.

Other research looks for alternative explanations. Wilson (2009) suggests that large positive temporary BTDs signal aggressive tax planning. But excessive and aggressive tax strategies cannot be sustained in the long term, consistent with lower earnings persistence documented in the literature. Using data snooping, Guenther (2011) finds a small subset of observations that he claims explain Hanlon's results. He asserts that the relation between earnings persistence and large book tax differences is driven by firms that are young, small, have high ROA and large transitory items. Using a life cycle measure (Dickinson 2011) to group firm-year observations into life cycle stages, Drake (2012) suggests that one reason the tax information contained in financial statements is informative is that the book tax income relation captures information on what life-cycle stage the firm is in. Tang and Firth (2012) show that abnormal negative and positive book tax spreads can provide incremental information about earnings persistence beyond the two measures of earnings management, discretionary accruals and total accruals, encouraging further research on BTDs adding value to the information content hypothesis.

Overall, the literature has provided support for the EM argument, that LPBTDs indicate higher discretionary accruals and that earnings persistence is reduced for LPBTDs due to short-term reversal of accruals. There is less evidence about why lower earnings persistence is associated with LNBTDs or why there is lower persistence of the cash flow components of accruals associated with LPBTDs and LNBTDs. Some clues about the sources of lower persistence come from other studies

such as Guenther (2011) or Drake (2012) but there is a lack of an alternative theory to bring together the information provided in these other studies.

***Direction of sales change***

Previous literature has found that the direction of sales change is a signal of disruption and changes in the underlying operations of a firm (e.g. Lev and Thiagarajan 1993; Banker and Chen 2006; Banker, Fang and Mehta 2015; Banker, Basu, and Byzalov 2016). Banker and Chen (2006) find that a time-series model that forecasts future earnings based on past earnings is more informative when it includes sales-down as a moderating variable. Banker et al. (2015) show that sales declines influence a firm's net profit margin differently than sales increases. They find that, during an economic crisis, firms experiencing sales declines cut costs more than firms experiencing sales increases, leading to an overall improvement in performance and profit margin for them.

Lev and Thiagarajan (1993) interpret situations of sales-down changes as negative signals because they are abnormal, on the other hand sales-up changes are recognized as positive signals because such changes are considered normal, expected and not disruptive. Banker, Basu, and Byzalov (2016) find that sales declines are likely to cause asset write-downs and goodwill impairments, indicating that the direction of sales change acts as a signal of managers' actions.

The direction of sales change has direct implications for earnings, cash flow and accrual persistence. A sales decline can act as an alarm signal to managers implying a need to improve or change the firm business model. Alternatively, a firm with increasing sales is more likely to continue on its current course of business. About 75% of sales declines are followed by a sales increase in the subsequent period whereas about 62% of sales increases are followed by a sales

increase. This suggests that sales declines are temporary and that managers respond quickly to try to stop the decline and turn the company around. Although most prior studies ignore the effect of the magnitude of sales changes relative to total sales, Ciftci and Zoubi (2019) investigate the impact of the magnitude of current sales changes on asymmetric cost behavior. Since managers are more likely to consider small (large) current sales decreases as temporary (permanent), they will be less (more) likely to cut costs for small (large) current sales decreases. Thus, information effects associated with sales down are more likely to be driven by larger changes in sales than smaller changes in sales.

## II.III. Hypotheses

Previous literature in management accounting suggests that sales down is an effective indicator of changes in operations triggered by a reduction in demand for a company's products or services. Such changes may include closing or terminating less productive plants, sales locations and products, reducing headcount or moving employees to other locations, shifting the product mix, and taking other steps to improve the efficiency of operations. Because these disruptive changes effectively change the business operations in ways that affect the continuity of earnings, sales-down is likely to be a strong indicator of reductions in earning persistence. Therefore, I test the following preliminary hypothesis to set up my hypotheses related to BTDs.

*H1: Persistence of pre-tax book income (PTBI) is negatively associated with sales down.*

As described above, the tax literature focuses on explaining how large book tax differences relate to earnings persistence (Hanlon 2005; Blaylock et al. 2012). This literature sorts firm-year observations into quintiles based on the size of BTDs deflated by total assets and labels the top quintile LPBTDs and the bottom quintile LNBTDs. By reviewing the components of BTDs described by Poterba, Rao and Seidman (2011), I find useful information about the types of items

that are likely to cause firms to have LPBTDs and LNBTDs. An important component of BTDs is the difference between depreciation for book purposes and for tax purposes. As Drake (2012) observed, growth firms have high deferred tax liabilities due to depreciation so LPBTD firms are likely to be early-stage companies. In fact, Guenther (2011) observed that young, small firms with high ROAs are among the firms with high BTDs. On the other hand, firms that are past the maturity stage and are no longer replacing physical assets are likely to have LNBTDs. Drake (2012) included life-cycle as an additional explanatory variable in her model, taking away some of the information in BTDs.

I follow an alternative approach and use the information in BTDs in conjunction with sales-down, as suggested by management accounting research, to examine whether operating changes precipitated by declining sales are more strongly associated with lower earnings persistence for firms with LPBTDs and LNBTDs. My key prediction is that the types of firms that have LPBTDs and LNBTDs are more likely to have disruptions associated with sales down that lead to changes in operations and less persistent earnings.

Firms in growth stages are susceptible to intense competitive pressures from other companies vying for industry leadership and from technology changes that upset their markets. Sales-down is likely to be particularly disruptive for these firms. Other factors that may contribute to large positive BTDs include bad debt write-offs greater than new additions to bad debt allowance or warranty expenditures greater than new additions to warranty reserves. These are both likely to happen when sales decline because new additions to these reserves are based on sales. High bad-debt write-offs are a signal of deteriorating markets and high warranty expenditures occur when product quality is slipping. Based on the above, I make the following hypothesis.

*H2: Persistence of pre-tax book income is lower for LPBTD companies when sales decline than for companies that do not have large BTDs when sales decline.*

Firms in decline stages are struggling to sustain their positions in the market and working hard to improve operating efficiency to keep ahead of competitors. Sales down is also likely to be disruptive for these firms. Other factors that reduce or cause large negative BTDs include asset write-downs, impairment charges, and special items that reduce book income but not taxable income. Disposals of assets that trigger higher taxable gains than book gains also lead to lower BTDs. These things also indicate firms that are more vulnerable to disruptions from sales-down and support the notion that firms with LNBTDs are likely to experience operating changes with sales declines that reduce earnings persistence.

*H3: Persistence of pre-tax book income is lower for LNBTD companies when sales decline than for companies that do not have large BTDs when sales decline.*

The Matrix below summarizes the relation between sales direction, earnings persistence and LBTDs for the three main hypotheses.

Sales-BTD Matrix

| | LBTD | |
|---|---|---|
| Sales Direction | Positive | Negative |
| Sales Up | ↓ EP[(1)] (because of EM[(2)]) | ↓ EP (no theory) |
| Sales Down | ↓ EP (EM, Operations) | ↓ EP (Operations) |
| | **H1 & H2** | **H1 & H3** |

[(1)]Earnings persistence
[(2)]Earnings management

Because my hypotheses are based on operations as opposed to earnings management, they apply to persistence of both cash flows and accruals. Accrual persistence may be particularly sensitive to operating changes. For instance, when companies in growth stages encounter dropping demand, their capital expenditures slow down or stop reducing persistence of accruals. Other items described above such as write-downs, impairment charges and changes to reserves may also affect the persistence of accruals.

## II.IV. Data and Empirical Models

I follow the procedures in Hanlon (2005) when selecting my sample, but expand the time period to include more recent years. I use 1994 as the starting point because this was the year that ASC 740 (formerly SFAS 109) became effective, which allows all observations to have consistent accounting for the tax variables. I begin with the Compustat annual dataset from 1995 to 2016 including 242,024 observations. I deliberately exclude data from 1994 to control for effects of the starting point. I eliminate utilities and financial services and firms not incorporated in the U.S. I drop 108,183 observations with SIC code from 6000 to 6799. I drop 24,206 observations with SIC code 4000 to 4999. I also eliminate firms with missing pre-tax income or pre-tax financial reporting losses (16,408 observations), negative current tax expense or a net operating loss, (71,246 observations). After deleting observations with missing data, my final sample contains 21,981 firm-year observations and 4,341 firms.

Again, following Hanlon (2005), I partition the sample based on whether a firm has a large positive or negative book tax difference. Such firms are identified by ranking book tax differences into quintiles by year. Firms with book tax differences in the highest quintile are labeled as having large positive book tax differences (LPBTDs), and those in lowest quintile as having large negative book tax differences (LNBTDs). The LPBTD sample contains 4,396 firm year observations and

1,018 firms, and the LNBTD sample comprises 4,395 firm-year observations and 999 firms, leaving 13,190 firm-year observations and 2,324 firms with small book tax differences.

Table 1 provides descriptive statistics. In Panel A, I see that the descriptive statistics for the full sample are largely in line with those of Hanlon (2005). However, my sample firms appear to be considerably larger, with average assets of 3,379 million, as compared to 1,726 million in Hanlon (2005). My sample is slightly more profitable based on PTBI, 0.137 versus 0.132. Consistent with prior research (Dechow 1994), both mean and median accruals are negative. Both mean and median cash flows are larger than pre-tax income, 0.160 and 0.148 vs. Hanlon's 0.143 and 0.136. The mean ETR of 34% is close to the statutory rate of 35%. ETR has been restricted to be between 0 and 1 as mentioned in the sample selection, deleting firm years with negative tax expense.

Table 1, Panels B and C present descriptive statistics for firms based on whether they experienced an increase or decrease in sales between the prior and current year. My sales-down sample is comprised of 4,070 firm-year observations and 587 firms, while the sales-up sample contains 17,911 firm-year observations and 3,754 firms. Following established literature (Sloan 1996), I scale variables by total average assets. PTBI represents pre-tax book income (Compustat variable PI), scaled by average assets (year-over-year change in Compustat variable AT). I see that firms with sales increases have significantly higher current and future PTBI, as well as current PTACC, PTCF, and ETR. Sales up firms also appear to be smaller than sales down firms. The univariate results show book tax differences are not statistically different between sales-up and sales-down firms.

Table 2 provides a correlation matrix. None of the correlations are large enough to warrant concern regarding multicollinearity. In addition, in both Spearman and Pearson coefficients (*-0.532* and *-0.53 $p<0.0001$*), cash flows and accruals are negatively correlated with each other, consistent

with prior literature (Dechow 1994). The association between book income and cash flows is higher than the association between accruals and book income, consistent with current earnings management literature.

## Table 1 – Descriptive Statistics

### Panel A: Full Sample

| Variable | N | Mean | Std. | 25% | Median | 75% |
|---|---|---|---|---|---|---|
| $PTBI_{t+1}$ | 21,981 | 0.128 | 0.099 | 0.062 | 0.107 | 0.17 |
| $PTBI_t$ | 21,981 | 0.137 | 0.105 | 0.067 | 0.114 | 0.178 |
| $PTCF_t$ | 21,981 | 0.163 | 0.121 | 0.092 | 0.148 | 0.218 |
| $PTACC_t$ | 21,981 | -0.026 | 0.088 | -0.070 | -0.033 | 0.005 |
| $BTD_t$ | 21,981 | 0.006 | 0.043 | -0.011 | 0.003 | 0.02 |
| Total $Assets_t$ | 21,981 | 3379 | 18146 | 29 | 210 | 970 |
| $ETR_t$ | 21,981 | 0.343 | 0.106 | 0.308 | 0.362 | 0.390 |
| DTE | 21,981 | 5.735 | 152 | -0.956 | 0.12 | 3.138 |
| REVENUE | 21,981 | 3906 | 17511 | 120.6 | 440 | 1670 |
| Pre Tax Income | 21,981 | 447 | 2,321 | 9.76 | 37 | 152 |

### Panel B: Sales-Up Sample

| Variable | N | Mean | Std. | 25% | Median | 75% |
|---|---|---|---|---|---|---|
| $PTBI_{t+1}$ | 17,911 | 0.135 | 0.099 | 0.067 | 0.114 | 0.178 |
| $PTBI_t$ | 17,911 | 0.146 | 0.107 | 0.076 | 0.123 | 0.188 |
| $PTCF_t$ | 17,911 | 0.167 | 0.125 | 0.093 | 0.153 | 0.225 |
| $PTACC_t$ | 17,911 | -0.021 | 0.09 | -0.066 | -0.030 | 0.011 |
| $BTD_t$ | 17,911 | 0.006 | 0.043 | -0.011 | 0.0028 | 0.02 |
| Total $Assets_t$ | 17,911 | 2916 | 15656 | 33 | 215 | 917 |
| $ETR_t$ | 17,911 | 0.343 | 0.103 | 0.311 | 0.363 | 0.390 |
| DTE | 17,911 | 6.28 | 141 | -0.963 | 0.117 | 2.99 |
| REVENUE | 17,911 | 3641 | 16571 | 123 | 435 | 1592 |
| Pretax Income | 17,911 | 425 | 2,211 | 10.6 | 38.5 | 149 |

## Table 1 – Descriptive Statistics (continued)

**Panel C: Sales-Down Sample**

| Variable | N | Mean | Std. | 25% | Median | 75% |
|---|---|---|---|---|---|---|
| $PTBI_{t+1}$ | 4,070 | 0.0.98 | 0.089 | 0.045 | 0.08 | 0.129 |
| $PTBI_t$ | 4,070 | 0.096 | 0.082 | 0.042 | 0.077 | 0.127 |
| $PTCF_t$ | 4,070 | 0.143 | 0.097 | 0.085 | 0.131 | 0.188 |
| $PTACC_t$ | 4,070 | -0.046 | 0.078 | -0.081 | -0.047 | -0.015 |
| $BTD_t$ | 4,070 | 0.0077 | 0.039 | -0.008 | 0.0035 | 0.02 |
| Total $Assets_t$ | 4,070 | 5416 | 26,360 | 15 | 185 | 1312 |
| $ETR_t$ | 4,070 | 0.340 | 0.122 | 0.291 | 0.355 | 0.390 |
| DTE | 4,070 | 3.33 | 191 | -0.9 | 0.133 | 3.99 |
| REVENUE | 4,070 | 5070 | 21120 | 109 | 468 | 2007 |
| Pre Tax Income | 4,070 | 544 | 2,754 | 6.45 | 30.5 | 164 |

## Table 2 – Pearson (below diagonal) and Spearman (above diagonal) Correlations

| | $PTBI_{t+1}$ | $PTBI_t$ | $PTCF_t$ | $PTACC_t$ | $BTD_t$ | Avg $Assets_t$ | $ETR_t$ |
|---|---|---|---|---|---|---|---|
| $PTBI_{t+1}$ | | 0.719* | 0.575* | 0.026* | -0.075* | -0.116* | 0.016* |
| | | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 | <.05 |
| $PTBI_t$ | 0.719* | | 0.674* | 0.167* | -0.028* | -0.147* | -0.012 |
| | <.0001 | | <.0001 | <.0001 | <.0001 | <.0001 | <0.1 |
| $PTCF_t$ | 0.60* | 0.701* | | -0.53* | -0.057* | -0.02* | 0.011 |
| | <.0001 | <.0001 | | <.0001 | <.0001 | 0.003 | 0.084 |
| $PTACC_t$ | 0.035* | 0.231* | -0.532* | | 0.039* | -0.138* | -0.024* |
| | <.0001 | <.0001 | <.0001 | | <.0001 | <.0001 | 0.0004 |
| $BTD_t$ | -0.040* | 0.021* | -0.039* | 0.078* | | 0.042* | 0.071* |
| | <.0001 | 0.002 | <.0001 | <.0001 | | <.0001 | <.0001 |
| Average | -0.048* | -0.05* | -0.022* | -0.030* | -0.011 | | -0.146* |
| $Assets_t$ | <.0001 | <.0001 | 0.001 | <.0001 | 0.103 | | <.0001 |
| $ETR_t$ | 0.014* | -0.026 | 0.020* | -0.058* | 0.081* | -0.061* | |
| | 0.0423 | 0.0001 | 0.003 | <.0001 | <.0001 | <.0001 | |

Table 2 shows the Pearson correlations (below diagonal) and the Spearman correlations (above diagonal). Below the correlations are the p-values. *Refer to Appendix A for variable definitions.*

To establish a baseline, I begin by estimating the basic persistence of pre-tax earnings by modeling future pre-tax earnings as a function of current pre-tax earnings for all three samples, (full sample, sales up and sales-down), as shown in the following equation

$$PTBI_{t+1} = \beta_0 + \beta_1 PTBI_t + \varepsilon_t \quad (1)$$

I expect the coefficient $\beta_1$ to be positive and significant at the 1% statistical level. Then, I add my variable of interest, sales-down or SD, which is a dummy variable equal to one if a firm's change in sales (Compustat SALE) from time t-1 to t is negative, and zero otherwise[8]. My first hypothesis predicts that firms with sales decreases have lower earnings persistence than firms with sales increases. To test my first hypothesis, I estimate the following equation:

$$PTBI_{t+1} = \beta_0 + \beta_1 PTBI_t + \beta_2 SD + \beta_3 SD \times PTBI_t + \varepsilon_t \quad (2)$$

Based on my hypothesis, I expect $\beta_1$>0, $\beta_2$<0 and $\beta_3$ to be negative at the 1% statistical level.

I then replicate Hanlon's (2005) model by introducing interactions for firms with large positive and large negative book tax differences. LNBTD is a dummy variable equal to one for firm-years with scaled temporary book tax differences in the lowest quintile of firms in each year, and zero otherwise. Similarly, LPBTD is a dummy variable equal to one for firm-years with scaled temporary book tax differences in the highest quintile of firms in each year, and zero otherwise.

$$PTBI_{t+1} = \beta_0 + \beta_1 PTBI_t + \beta_2 LNBTD_t + \beta_3 LPBTD + \beta_4 LNBTD \times PTBI_t + \beta_5 LPBTD \times PTBI_t + \varepsilon_t \quad (3)$$

Based on Hanlon (2005), I expect $\beta_4$ and $\beta_5$ to be negative.

To test my hypotheses 2 and 3, I interact my dummy variable for sales-down with LNBTD and LPBTD.

[8] This definition is based on prior accounting literature in sales change.
It should be noted the literature does not discriminate based on the magnitude and size of the sales.

$$PTBI_{t+1} = \beta_0 + \beta_1 PTBI_t + \beta_2 LNBTD_t + \beta_3 LPBTD + \beta_4 LNBTD \times PTBI_t + \beta_5 LPBTD \times PTBI_t$$

$$+ \beta_6 SD + \beta_7 SD \times PTBI_t + \beta_8 LNBTD \times SD + \beta_9 LPBTD \times SD + \beta_{10} LNBTD \times PTBI_t \times SD$$

$$+ \beta_{11} LPBTD \times PTBI_t \times SD + \varepsilon_t \quad (4)$$

Based on my predictions, I expect statistically significant negative coefficients on the three-way interaction terms between sales down, pre-tax book income and LNBTD and LPBTD respectively. Thus, I expect $\beta_{10}$ and $\beta_{11}$ to be statistically significant and negative.

Cash flow is considered a better indicator of companies' financial performance than net income, since cash flow is subject to less distortion based on different accounting practices (Dechow, 1994). In order to more directly test her claims regarding BTDs as indicators of persistence due to earnings management, Hanlon (2005) breaks earnings into pre-tax accruals (PTACC) and pre-tax cash flow (PTCF) components as described in the following basic equation:

$$PTBI_{t+1} = \beta_0 + \beta_1 PTCF_t + \beta_2 PTACC_t + \varepsilon_t \quad (5)$$

I follow Hanlon's next empirical model and separate pre-tax earnings into its accrual and cash flow components. I measure pre-tax cash flows (PTCF) as the sum of total operating cash flows (Compustat variable OANCF) and taxes paid in cash (Compustat variable TXPD), less cash flow due to extraordinary items (Compustat variable XIDOC). Pre-tax accruals (PTACC) are measured as the difference between pre-tax book income (PTBI) and pre-tax cash flows (PTCF). Both PTCF and PTACC are scaled by average assets. I use the following two equations to estimate the persistence of pre-tax cash flows and accruals.

$$PTBI_{t+1} = \beta_0 + \beta_1 PTCF_t + \beta_2 PTACC_t + \beta_3 SD + \beta_4 \times SD \times PTCF_t + \beta_5 \times SD \times PTACC_t + \varepsilon_t$$

*(6)*

Based on hypothesis 1 (sales-down), I expect the coefficients $\beta_4$ and $\beta_5$ to be significantly negative at the 1% statistical level.

To estimate Hanlon's (2005) expanded model, I take the basic cash/accrual persistence model and expand the model by adding and interacting the components with my variables for large BTDs.

$$PTBI_{t+1} = \beta_0 + \beta_1 PTCF_t + \beta_2 PTACC_t + \beta_3 LNBTD + \beta_4 LPBTD + \beta_5 \times LNBTD \times PTCF_t + \beta_6 \times LPBTD \times PTCF_t + \beta_7 \times LNBTD \times PTACC_t + \beta_8 \times LPBTD \times PTACC_t + \varepsilon_t \quad (7)$$

Following Hanlon, I predict the coefficients $\beta_7$ and $\beta_8$ to be statistically significant and negative.

The final model is the comprehensive integrated model that captures different elements and sources of earnings persistence.

$$PTBI_{t+1} = \beta_0 + \beta_1 PTCF_t + \beta_2 PTACC_t + \beta_3 LNBTD + \beta_4 LPBTD + \beta_5 \times LNBTD \times PTCF_t + \beta_6 \times LPBTD \times PTCF_t + \beta_7 \times LNBTD \times PTACC_t + \beta_8 \times LPBTD \times PTACC_t + \beta_9 SD + \beta_{10} \times SD \times PTCF_t + \beta_{11} \times SD \times PTACC_t + \beta_{12} \times SD \times LNBTD + \beta_{13} \times SD \times LPBTD + \beta_{14} \times SD \times LNBTD \times PTCF_t + \beta_{15} \times SD \times LPBTD \times PTCF_t + \beta_{16} \times SD \times LNBTD \times PTACC_t + \beta_{17} \times SD \times LPBTD \times PTACC_t + \varepsilon_t \quad (8)$$

My conjecture suggests that both the accruals and cash flow components of earnings will exhibit lower persistence when sales decline. Thus, I expect that the net earnings persistence coefficients will be smaller for sales down firms than for sales up firms (incremental sales-down coefficients will be negative). I predict significantly negative coefficients $\beta_{16}$ and $\beta_{17}$ (accruals) but also statistically negative incremental coefficients $\beta_{14}$ and $\beta_{15}$ (cash flows).

***Results of estimating the empirical models***

Table 3, Panel A presents the preliminary results from estimating the basic persistence model described in equation 1. In column 1, I see that the firms in my sample exhibit persistent

earnings behavior, as evidenced by the positive coefficient on $PTBI_t$. In columns 2 and 3, I estimate equation 1 separately for sales-up and sales-down firms. I find that both sales up and sales down firms exhibit persistent behavior, similar to the full sample. However, in comparing the two columns, I see that the coefficient on $PTBI_t$ is smaller for sales-down firms than sales-up firms, suggesting lower earnings persistence for sales-down firms.[9]

In Table 3, Panel B, I estimate equation (2). For the full sample (column 1 of Panel B), the results support persistence of both cash flows and accruals through significant coefficients on the earnings components coefficients of *PTCF* and *PTACC.* A comparison of the results presented in columns 2 and 3 for sales-up and sales-down firms respectively indicate lower coefficients on both *PTCF* and *PTACC* for sales down firms, suggesting lower earnings persistence for these firms.

In Table 4, I present the results of estimating models relating earnings persistence to sales-down by itself (column 1), earnings persistence to the Hanlon (2005) variables (column 2), and earnings persistence to the interactions of sales-down and the Hanlon (2005) variables LNBTD and LPBTD. The estimation in column 1 provides support for reduced persistence of earnings associated with sales-down. The estimation in column 2, which represents the results for the full sample, produces results consistent with Hanlon (2005). Firms with large negative and positive book tax differences have less persistent pre-tax book earnings, as evidenced by the significantly negative and coefficients on ($LNBTD \times PTBI_t$ =-0.039) and ($LPBTD \times PTBI_t$=-0.075).

[9] The comparisons made across the columns for table 3 are casual – statistical tests of differences between sales-down and sales-up are made based on models presented in subsequent tables where SD is included as a dummy variable.

**Table 3 – Basic Tests of Earnings Persistence**

Panel A: Pre-Tax Book Income

$$PTBI_{t+1} = \beta_0 + \beta_1.PTBI_t + \varepsilon_t$$

| | **Full Sample** | | **Sales Up Firms** | | **Sales Down Firms** | |
|---|---|---|---|---|---|---|
| | (1) | | (2) | | (3) | |
| $PTBI_t$ | 0.676 | *** | 0.686 | *** | 0.578 | *** |
| | (0.000) | | (0.000) | | (0.000) | |
| Intercept | 0.035 | *** | 0.034 | *** | 0.042 | *** |
| | (0.000) | | (0.000) | | (0.000) | |
| **# of Obs** | 21,981 | | 17,911 | | 4,070 | |
| **R-squared** | 0.52 | | 0.55 | | 0.28 | |

Panel B: Pre-Tax Book Income with Cash Flows and Accruals

$$PTBI_{t+1} = \beta_0 + \beta_1.PTCF_t + \beta_2.PTACC_t + \varepsilon_t$$

| | **Full Sample** | | **Sales Up Firms** | | **Sales Down** | |
|---|---|---|---|---|---|---|
| | (1) | | (2) | | (3) | |
| $PTCF_t$ | 0.707 | *** | 0.713 | *** | 0.627 | *** |
| | (0.000) | | (0.000) | | (0.000) | |
| $PTACC_t$ | 0.551 | *** | 0.563 | *** | 0.436 | *** |
| | (0.000) | | (0.000) | | (0.000) | |
| Intercept | 0.027 | *** | 0.028 | *** | 0.028 | *** |
| | (0.000) | | (0.000) | | (0.000) | |
| # of Obs | 21,981 | | 17,911 | | 4,070 | |
| R-squared | 0.53 | | 0.57 | | 0.31 | |

## Table 4 – Persistence of Pre-Tax Book Income

**Results of Estimating Models with Sales-Down (SD) and Book tax Differences (BTDs)**

| | SD only Model (1) | | No SD Model (2) | | Integrated Model (3) | |
|---|---|---|---|---|---|---|
| $PTBI_t$ | 0.686 | *** | 0.697 | *** | 0.694 | *** |
| | (0.000) | | (0.000) | | (0.000) | |
| LNBTD | | | 0.017 | *** | 0.014 | *** |
| | | | (0.000) | | (0.000) | |
| LPBTD | | | 0.007 | | 0.004 | * |
| | | | (0.000) | | (0.059) | |
| $LNBTD*PTBI_t$ | | | -0.039 | *** | -0.018 | * |
| | | | (0.000) | | (0.085) | |
| $LPBTD*PTBI_t$ | | | -0.075 | *** | -0.044 | *** |
| | | | 0.000 | | (0.001) | |
| SD | 0.007 | *** | | | -0.002 | |
| | (0.000) | | | | (0.323) | |
| SD*PTBI | -0.108 | *** | | | 0.016 | |
| | 0.000 | | | | (0.399) | |
| LNBTD*SD | | | | | 0.022 | *** |
| | | | | | (0.000) | |
| LPBTD*SD | | | | | 0.017 | *** |
| | | | | | (0.001) | |
| LNBTD*SD*PTBI | | | | | -0.231 | *** |
| | | | | | (0.000) | |
| LPBTD*SD*PTBI | | | | | -0.237 | *** |
| | | | | | (0.000) | |
| Intercept | 0.034 | *** | 0.031 | *** | 0.032 | *** |
| | (0.000) | | (0.000) | | (0.000) | |
| # of Obs | 21,981 | | 21,981 | | 21,981 | |
| R-squared | 0.519 | | 0.5216 | | 0.5246 | |

This table represents the tests of earnings persistence. Column 1 shows the results of tests based on the direction of sales change. Column 2 shows the results for the effect of large negative and large positive book tax differences. Column 3 shows the results for the effects of sales down, large negatie and large positive book tax differences and the interactions. Standard errors are shown in parentheses. ***, **, * represent 1, 5, and 10 percent statistical significance, respectively. Refer to Appendix A for variable definitions.

As mentioned, the magnitude of the coefficient for *(LPBTD x PTBI)* is twice as large as the coefficient for LNBTD x PTBI (or - 0.075 vs. - 0.039). This may warrant some discussion since it includes not only statistical significance, but also economic importance, and this interesting difference could enlighten the reader.

Column 3 of Table 4 presents the results of estimating equation 4 that includes the integration of both the sales-down dummy and the BTD variables. These results provide strong support for the incremental reduction in persistence of PTBI for sales-down firms experiencing either LNBTDs or LPBTDs. I note that the coefficients for sales-up on ($LNBTD \times PTBI_t$ = -0.018) and ($LPBTD \times PTBI_t$ = -0.044) are modest in magnitude compared to the incremental coefficients for sales-down observations on ($LNBTD \times SD \times PTBI_t$ = -0.231) and ($LPBTD \times SD \times PTBI_t$ = -0.237). In other words, the effects of the large BTDs for sales-down observations are much stronger than for sales-up observations. These results support the prediction of the alternative argument that operations changes associated with declining sales have a pronounced effect on earnings persistence for companies with LNBTDs and LPBTDs. The economic and statistical significance of the 3-way interaction coefficients in Column 3 of Table 4, *(LPBTD*SD*PTBI*= -0.237) and *(LNBTD*SD*PTBI*= -0.231), offers support for the separation of LPBTD and LNBTD sub-samples in the interaction terms of the regression.

Table 5 presents the results of my tests of cash flow and accruals persistence. The results presented in the first column (sales-down only) support the prediction that persistence of PTBI with respect to both cash flows and accruals is significantly reduced when sales decline.

**Table 5 – Persistence of Pre-Tax Book Income with Cash Flows and Accruals**

**Results of Estimating Models with Sales-Down (SD) and Book tax Differences (BTDs)**

| | SD only Model (1) | | No SD Model (2) | | Integrated Model (3) | |
|---|---|---|---|---|---|---|
| $PTCF_t$ | 0.713 | *** | 0.726 | *** | 0.726 | *** |
| | (0.000) | | (0.000) | | (0.000) | |
| $PTACC_t$ | 0.563 | *** | 0.572 | *** | 0.557 | *** |
| | (0.000) | | (0.000) | | (0.000) | |
| LNBTD | | | 0.014 | *** | 0.014 | *** |
| | | | (0.000) | | (0.000) | |
| LPBTD | | | 0.006 | *** | 0.006 | *** |
| | | | (0.002) | | (0.009) | |
| $LNBTD*PTCF_t$ | | | -0.036 | *** | -0.026 | *** |
| | | | (0.000) | | (0.017) | |
| $LPBTD*PTCF_t$ | | | -0.073 | *** | -0.056 | *** |
| | | | (0.000) | | (0.000) | |
| $LNBTD*PTACC_t$ | | | -0.037 | *** | 0.006 | |
| | | | (0.007) | | (0.69) | |
| $LPBTD*PTACC_t$ | | | -0.057 | *** | 0.003 | |
| | | | (0.000) | | (0.82) | |
| SD | 0.007 | | | | 0.0008 | |
| | (0.74) | | | | (0.738) | |
| SD*PTCF | -0.085 | *** | | | -0.009 | |
| | (0.000) | | | | (0.63) | |
| SD*PTACC | -0.126 | *** | | | 0.081 | *** |
| | (0.000) | | | | (0.003) | |
| LNBTD*SD | | | | | -0.003 | |
| | | | | | (0.558) | |
| LPBTD*SD | | | | | 0.001 | |
| | | | | | (0.931) | |

| | | | | | | |
|---|---|---|---|---|---|---|
| LNBTD*SD*PTCF | | | | | -0.119 | *** |
| | | | | | (0.001) | |
| LPBTD*SD*PTCF | | | | | -0.126 | *** |
| | | | | | (0.001) | |
| LNBTD*SD*PTACC | | | | | -0.363 | *** |
| | | | | | (0.000) | |
| LPBTD*SD*PTACC | | | | | -0.322 | *** |
| | | | | | (0.000) | |
| Intercept | 0.027 | *** | 0.024 | *** | 0.024 | *** |
| | (0.000) | | (0.000) | | (0.000) | |
| # of Obs | 21,981 | | 21,981 | | 21,981 | |
| R-squared | 0.54 | | 0.54 | | 0.54 | |

This table represents the tests of earnings persistence. Column 1 shows the results of tests based on the direction of sales change. Column 2 shows the results for the effect of large negative and large positive book tax differences. Column 3 shows the results for the effects of sales down, large negatie and large positive book tax differences and the interactions. Standard errors are shown in parentheses. ***, **, * represent 1, 5, and 10 percent statistical significance, respectively. Refer to Appendix A for variable definitions.

Based on Dechow (1994) study, which states that "Cash Flow is a better indicator than Net Income", I expect the cash flow and accruals persistence coefficients provide information on top of what has already been deduced so far. This is because cash flows, compared to GAAP income, better reflect the more persistent activities of a firm. The estimation presented in the second column replicates Hanlon's model with coefficients on the interactions between the BTDs and pre-tax cash flows and pre-tax accruals respectively: ($LNBTD \times PTCF_t$ = -0.036), ($LPBTD \times PTCF_{t=}$ -0.073), ($LNBTD \times PTACC_t$ = -0.037), *(*$LPBTD \times PTACC_t$ = -0.057). The estimation presented in the third column provides striking evidence of the role of sales-down in reducing the persistence of PTBI with respect to both cash flows and accruals. First, with respect to cash flows, the coefficients for the sales-up observations are relatively small, ($LNBTD \times PTCF_t$ = -0.026), ($LPBTD \times PTCF_t$ =

-0.056), compared to the incremental coefficients for the sales-down observations, ($LNBTD \times SD \times PTCF_t$ = -0.119) and ($LPBTD \times SD \times PTCF_t$ = -0.126), again supporting the operations argument that persistence is reduced due to operations changes associated with sales declines. More interesting, with respect to accruals, the coefficients for sales-up observations vanish (neither are significant) and the incremental coefficients are especially large, ($LNBTD \times SD \times PTACC_t$ = -0.363) and ($LPBTD \times SD \times PTACC_t$ = -0.322), given that the base earnings persistence variable is about 0.726.

Overall, the results provide strong support for the operations argument as incrementally informative about the persistence properties of LNBTDs and LPBTDs to EM. In addition, the operations argument is more universal because it applies to both LNBTDs and LPBTDs and it applies to both cash flows and accruals.

***Additional information for the LNBTD case***

In untabulated results, I find that the frequency of asset write-downs, goodwill impairments, and special items is higher for firm-year observations with large negative book tax differences, as evidenced by the larger number of observations that have non-zero values for these variables as compared to firm-year observations with large positive book tax differences. I also find that firms with large negative book tax differences have larger asset write-downs and goodwill impairments, and that special items are significantly more negative for firms with large negative book tax differences. These results are consistent with the argument that disruptive changes that accompany a decline in sales lead to large negative book tax differences.

## II.V. Conclusion

My study builds on the tax literature (Hanlon 2005 and Blaylock et al. 2012) to provide additional evidence on the role of book tax differences in identifying differences in the persistence of earnings and its cash flow and accrual components by adopting a new perspective obtained from the management accounting literature, how operations are affected by sales decline. I find that the direction of sales change is an important piece of the puzzle. I provide an alternative explanation for the finding in Hanlon (2005) that firm-years with large negative book tax differences have lower earnings persistence.

I reinforce the sentiment expressed by Tang and Firth (2012), "Overall, the results suggest that the differing components of BTDs have differential implications for earnings quality. Additional tests show that abnormal BTDs and normal BTDs can provide incremental information about earnings persistence beyond the information in discretionary accruals and total accruals, suggesting that the investigation into the components of BTDs adds value to financial analysis."

## Appendix A: Variable Definitions

| Variable Name | Definition |
|---|---|
| $BTD_t$ (book tax differences) | The sum of federal and foreign deferred taxes (Compustat TXDFED and TXDFO), grossed up by the statutory tax rate (35% in my sample period), and scaled by average assets. If either federal or foreign deferred taxes are missing, total deferred taxes (Compustat TXDI) is used instead. |
| $ETR_t$ (effective tax rate) | Total income taxes (Compustat TXT or TXTQ) divided by pre-tax book income (Compustat PI or PIQ). $ETR_t$ is limited to be between 0 and 1. |
| LNBTD (large negative book tax differences) | A dummy variable, which is equal to one for firm-years with $BTD_t$ in the lowest quintile of firms in each year, and zero otherwise |
| LPBTD (large positive book tax differences) | A dummy variable, which is equal to one for firm-years with $BTD_t$ in the highest quintile of firms in each year, and zero otherwise |
| Operating profit margin | Sales revenue (Compustat variable SALE), less operating expenses (the sum of Compustat variables COGS, XSGA, and XRD), divided by sales revenue. |
| $PTACC_t$ (pre-tax accruals) | The difference between $PTBI_t$ and $PTCF_t$, scaled by average assets |
| $PTBI_{t+1}$ (pre-tax book income) | Pre-tax book income (Compustat PI or IBQ) for year t+1, scaled by average assets from year t to t+1 |
| $PTBI_t$ (pre-tax book income) | Pre-tax book income (Compustat PI or IBQ) for year t, scaled by average assets from year t-1 to t |
| $PTCF_t$ (pre-tax cash flows) | The sum of total operating cash flows (Compustat OANCF) and cash taxes paid (Compustat TXPD), less cash flow due to extraordinary items (Compustat XIDOC), scaled by average assets |
| SD | A dummy variable equal to one if a firm's change in sales (Compustat SALE) from time t-1 to t is negative, and zero otherwise |
| Asset impairments | Asset impairments (Compustat WDP), scaled by market value (MKVALT) |
| Goodwill impairment | Goodwill impairment (Compustat GDWLIP), scaled by market value (MKVALT) |
| Special items | Special items (Compustat SPI), scaled by market value (MKVALT) |

# CHAPTER THREE

# III. Large BTDs, Earnings Persistence, and Investment Expenditures

**ABSTRACT:** *I* re-examine the question why large positive and large negative book tax differences (LPBTDs and LNBTDs) are associated with lower earnings persistence (Hanlon, 2005). Specifically, I investigate whether lower earnings persistence of LPBTD firms and LNBTD firms, relative to firms in the middle BTD quintiles, is due to earnings management or is a consequence of high levels of investment expenditures. First, I show that high CAPX (HiCAPX) firms and high R&D (HiR&D) firms are disproportionately represented in the LPBTD and LNBTD quintiles respectively, whereas high discretionary accrual (HiDA) firms are uniformly distributed across the LPBTD, LNBTD and middle BTD quintiles. Next, I find that HiDA firms are associated with lower earnings persistence in all BTD quintiles, but HiCAPX and HiR&D firms are only associated with lower earnings persistence in the LPBTD and LNBTD quintiles respectively. Extending the Hanlon (2005) model, I demonstrate that the differential earnings persistence associated with LPBTDs and LNBTDs comes from the intersection of HiCAPX and LPBTD firms and the intersection of HiR&D and LNBTD firms respectively. These intersections reflect growth through investment in physical capital and innovation through investment in R&D respectively.

## III.I. Introduction

Hanlon (2005) investigates earnings, accruals, and cash flow persistence for firms with large positive and negative book tax differences (LPBTDs and LNBTDs).[10] Her results indicate that the presence of large BTDs, regardless of their direction, is associated with lower earnings persistence. She observes that lower earning persistence associated with the presence of large BTDs is consistent with high levels of accruals-based earnings management that reduce earnings quality. Hanlon finds support for this argument by demonstrating that lower earnings persistence associated with large BTDs is more pronounced for accruals versus cash flows. Blaylock et al. (2012) focus on the role of large positive BTDs in reducing earnings persistence and find lower persistence for LPBTD firms with high discretionary accruals (HiDA) but not for LPBTD firms with high levels of tax avoidance. Less attention has been paid to large negative BTDs (LNBTDs), possibly because they do not result from income-increasing discretionary accruals or tax avoidance.

In this study, I re-examine the question why large positive and large negative BTDs are associated with lower earnings persistence for U.S. firms. Specifically, I consider whether the differential earnings persistence between firms in the LPBTD quintile or the LNBTD quintile and firms in the middle BTD quintiles is due to earnings management or whether it is a consequence of high levels of investment expenditures. Conceptually, the link between BTDs and earnings management is based on the observation that book income is more malleable than taxable income so large BTDs may represent timing differences resulting from earnings management (Mills and Newberry 2001, Joos, Pratt and Young 2000). This reasoning applies

[10] I follow previous research that has focused on book tax differences that arise from timing differences between book and tax recognition as opposed to permanent differences. Large positive BTDs (scaled by total assets) are firm-year observations in the top quintile of BTDs and large negative BTDs are firm-year observations in the bottom quintile of BTDs.

more readily to large positive BTDs than large negative BTDs. In fact, large negative BTDs arise when book income is lower than taxable income and are puzzling because conventional wisdom suggests that managers seek to maximize book income for financial reporting and minimize taxable income for tax reporting purposes.

Large BTDs may also result from timing differences in book and tax recognition of revenues (gains) and expenses (losses) associated with investment expenditures. Because capital assets are typically depreciated on an accelerated basis for U.S. tax purposes and a straight-line basis for accounting purposes, companies that are growing through CAPX will have higher positive BTDs. For innovation-oriented companies that invest more in intangible assets, early expense recognition, amortization of acquired intangibles, reserve build-ups and write-downs or impairments may result in high negative BTDs. Previous research indicates that the variability and quality of future earnings are associated with investments in R&D and, to a somewhat lesser extent, capital investments (Amir, Guan, and Livne, 2007; Kothari, Laguerre and Leone, 2002). Thus, it is worthwhile to investigate whether differential earnings persistence associated with large BTDs is related to high levels of investment in CAPX or R&D.

Accordingly, I begin my analysis by looking at the BTD profiles of industries and observe that companies in industries characterized by high capital expenditures are prominent in the LPBTD sample and companies in industries characterized by high research and development expenditures are prominent in the LNBTD sample. I crystallize these findings by forming quintiles based on CAPX and R&D (both deflated by total assets) and find that the frequency of HiCAPX (top quintile) companies in the LPBTD sample and HiR&D (top quintile) companies in the LNBTD sample is higher than would be expected if high CAPX and high R&D

companies were uniformly distributed across the BTD quintiles. In contrast, I observe that the frequency of high discretionary accrual (HiDA) companies is almost uniformly distributed across the LPBTD, LNBTD, and middle BTD quintiles.[11]

To examine how earnings persistence is associated with HiDA, HiCAPX and HiR&D, I estimate an earnings persistence model that relates pre-tax book income in t+1 ($PTBI_{t+1}$) to pre-tax book income in period t ($PTBI_t$) and includes HiDA, HiCAPX and HiR&D as variables that may influence earnings persistence (interacted with $PTBI_t$). For my full sample, I find that earnings persistence is negatively associated with HiDA, HiCAPX and HiR&D. Of the three, HiDA is the most potent in terms of reducing earnings persistence. When I estimate this model separately for the LPBTD, LNBTD and middle BTD quintiles (similar to the approach used by Blaylock et al. 2012 for the LPBTD quintile), I see that HiCAPX is associated with lower earnings persistence for the LPBTD quintile and HiR&D is associated with lower earnings persistence for the LNBTD quintile only.[12] HiDA, on the other hand, reduces earnings persistence for all quintiles.

Next, I estimate the Hanlon (2005) persistence model that includes two-way interaction terms (*PTBI-LPBTD)* and (*PTBI-LNBTD)*. I replicate Hanlon's finding that LPBTD and LNBTD firms have lower earning persistence relative to the middle BTD quintiles (the estimated coefficients on the two interactions are significantly negative). I then estimate an expanded specification that includes high discretionary accruals (*HiDA*). This specification includes three-way interactions (*HiDA-PTBI-LPBTD)* and *(HiDA-PTBI-LNBTD)* as well as a

[11] Throughout my analysis, I refer to the three quintiles between the LPBTD and LNBTD quintiles as the middle BTD quintiles. As in Hanlon (2005), I do not separately analyze the three middle quintiles but treat the three quintiles together as the reference group for the LBPTD and LNBTD quintiles.

[12] HiCAPX is associated with a slightly lower earnings persistence for the middle BTD firms that I treat as inconsequential.

two-way interaction (*HiDA-PTBI)*, while retaining the two-way interactions (*PTBI-LPBTD)* and *(PTBI-LNBTD)*. I find that the estimated coefficient on (*HiDA-PTBI)* is significantly negative, consistent with lower earnings persistence for HiDA firms in general. But the coefficients on (*HiDA-PTBI-LPBTD)* and *(HiDA-PTBI-LNBTD)* are both significantly positive, indicating that there are not negative differential effects associated with HiDA for the LPBTD and LNBTD quintiles relative to the middle BTD quintiles. I also find that the two-way interactions, (*PTBI-LPBTD)* and (*PTBI-LNBTD)*, retain their significantly negative coefficients and their magnitudes are similar to those obtained from estimating the original Hanlon specification. Thus, my evidence indicates that, in the context of the Hanlon (2005) model, the lower earnings persistence associated with LPBTDs and LNBTDs, relative to the middle BTD quintiles, is not due to differences in persistence of earnings for high discretionary accrual firms across the BTD quintiles.[13]

Then, I include HiCAPX and HiR&D by adding three-way interactions (*HiCAPX-PTBI-LPBTD), (HiCAPX-PTBI-LNBTD), (HiR&D-PTBI-LPBTD), (HiR&D-PTBI-LNBTD)* and two-way interactions (*HiCAPX-PTBI)* and *(HiR&D-PTBI)*, to the expanded Hanlon (2005) specification for HiDA described above. In this case, the estimated coefficients on the three-way terms (*HiCAPX-PTBI-LPBTD)* and (*HiR&D-PTBI-LNBTD)* are significantly negative whereas the estimated coefficients on the two-way terms (*HiCAPX-PTBI)* and *(HiR&D-PTBI)* are not significantly different from zero. These results are consistent with firms in the intersecting set of HiCAPX and LPBTD and the intersecting set of HiR&D and LNBTD having lower earnings persistence than firms in the middle BTD quintiles. Moreover, the estimated

[13] This should not be interpreted to mean that high discretionary accrual firms in the LPBTD and LNBTD quintiles do not have lower earnings persistence than other firms in those quintiles. In fact, they do have lower earnings persistence relative to other firms in those quintiles. But, the lower earnings persistence of high discretionary accrual firms is present in all quintiles, including the middle BTD quintiles, so it is not the source of distinction between the large BTD and middle BTD quintiles.

coefficients on the original (*PTBI-LPBTD)* and *(PTBI-LNBTD)* terms in the Hanlon specification are no longer significantly negative in this specification. This evidence indicates that HiCAPX interacted with LPBTD and HiR&D interacted with LNBTD pick up the lower earnings persistence associated with LPBTDs and LNBTDs respectively. With respect to earnings management, the coefficient on (*HiDA-PTBI)* is significantly negative as in the previous estimation. In this case, the estimated coefficient on (*HiDA-PTBI-LPBTD)* is not significantly different from zero and the estimated coefficient on (*HiDA-PTBI-LNBTD)* remains significantly positive. Together, these results demonstrate that the lower earnings persistence associated with LPBTDs is due to the intersection of HiCAPX and LPBTD firms and the lower earnings persistence associated with LNBTDs is due to the intersection of HiR&D and LNBTD firms

My results support an alternative explanation to the earnings management explanation offered in previous research. While I find lower earnings persistence associated with discretionary accruals as documented by Blaylock et al. (2012) for LPBTD firms, the differences in persistence between the LPBTD or LNBTD quintiles and the middle BTD quintiles is not due to differences in earnings persistence associated with high discretionary accruals across the quintiles. Rather, these differences are associated with the investment profiles of companies. The lower earnings persistence of LPBTDs is concentrated in companies that are making high CAPX investments and the lower earnings persistence of LNBTDs is concentrated in companies that are making high R&D investments. The intersection of HiCAPX and LPBTD portrays an investment strategy focused on growth in physical assets. The intersection of HiR&D and LNBTD portrays an investment strategy focused on innovation through development of intangible assets.

Of particular interest, my findings help to resolve the LNBTD puzzle – why managers take actions or make decisions that cause them to report lower income for book purposes compared to tax purposes. Managers who are willing to bear the consequences of reporting low income in the current year must be optimistic that they will benefit from future performance, possibly through future bonus pay or appreciation of stock values and option rights.[14] This is likely to be the case when managers are investing in innovation that necessarily involves uncertainty about future outcomes.

The remainder of this paper proceeds as follows. In section II, I review relevant research and develop my hypotheses. In section III, I present the empirical models. In section IV, I describe the data and present the empirical results. In section V, I conclude by discussing the implications and limitations of my research.

## III.II. Literature and Hypotheses

Research has drawn attention to the gap between financial earnings and taxable income, which has increased since the 1990s (Mills 1998, Mills et al. 2002; Manzon and Plesko 2001). The gap stems from differences between the book-basis balance sheet accounts and the corresponding tax-basis balance sheet accounts. GAAP accounting methods provide managers flexibility in their choice of accounting procedures and use of various estimates (Watts and Zimmerman 1986). The logic for using BTDs to infer information is that there are more constraints and less discretion in the determination of taxable income versus accounting income.

***Book tax differences and tax avoidance***

[14] Optimism does not mean certainty. Investments in innovation have real option qualities.

A series of studies consider book tax differences as evidence of tax avoidance. Mills (1998) asserts that BTDs provide information about the extent to which firms reduce taxable income to avoid taxes. Following the Enron scandal that highlighted book tax differences (Seida 2003), Desai (2003), Desai and Dharmapala (2006), Frank et al. (2009), and Seidman (2010) use BTD measures to provide evidence of tax planning and tax sheltering activities. Lev and Nissim (2004), in lieu of BTD, use the tax to book ratio, their logic being that the construction of the comprehensive tax fundamental reflects all three tax components, pretax discretionary accruals, discretionary tax accruals, and nondeductible pretax accruals.

***Book tax differences and earnings persistence***

The investigation of earnings persistence and earnings management from a book tax difference perspective was evident in the Burgstahler and Dichev (1997) and Mills and Newberry (2001) studies. They consider whether deferred tax expenses are informative in identifying earnings management targets. This laid the foundation for Philips et al. (2003), who investigate whether deferred tax expenses, which arise from temporary book tax differences, provide incrementally useful evidence about earnings management. The basis for their argument is that managers are given higher discretionary power over how to record and report their earnings under financial reporting rules compared to tax reporting, because computation of taxable income follows a strict and pre-determined set of formulae, computed using established protocols and procedures. Assuming managers take advantage of financial reporting flexibility to inflate their earnings upwards, keeping taxable income constant, earnings management behavior will consequently generate book tax differences. Their findings provide evidence congruent with this hypothesis.

Hanlon (2005) investigates earnings, accruals, and cash flow persistence for firms with large positive and negative book tax differences. Her results indicate that the presence of large BTDs, regardless of their direction, decreases earnings persistence, and she observes that the reduction in persistence caused by the presence of large positive book tax differences is consistent with positive book tax differences indicating lower earnings quality. She argues that large book tax differences resulting from income-increasing accrual choices, that are not included for tax purposes, must reverse in the future, resulting in less persistent earnings and accruals for firms with large book tax differences. Hanlon (2005) finds that not just earnings and accruals but also cash flows are less persistent for large BTD firms.

Subsequent studies attempt to support these explanations or find evidence of alternative explanations for the BTD earnings quality relations. Wilson (2009) suggests that large positive temporary BTDs signal aggressive tax planning. But excessive and aggressive tax strategies cannot be sustained in the long term, consistent with lower earnings persistence documented in the literature. Seidman (2010) provides evidence that variation in book tax differences over time can be explained by changes in GAAP and general macroeconomic conditions. He also finds that earnings management contributes to the lower earnings persistence for firms with large book tax differences. Blaylock et al. (2012) focus on large positive book tax differences and earnings persistence. In their study, they form quintiles within the LPBTD sub-sample based on discretionary accruals (earnings management) and 3-year effective tax rates (tax avoidance). They find that lower earnings persistence is associated with the high discretionary accruals quintile and not with the high tax avoidance quintile, supporting the earnings management hypothesis over the tax avoidance hypothesis.

Using data snooping, Guenther (2011) finds a small subset of observations that he claims explain Hanlon's (2005) results. Analysis of these influential observations suggests that the relationship between earnings persistence and large book tax differences is driven by young firms, small firms, firms with a high return on assets, and firms with large transitory items. Using a life cycle measure (Dickinson 2011) to group firm-year observations into life cycle stages, Drake (2012) suggests that one reason the tax information contained in financial statements is informative is that the book tax income relation captures information on what life-cycle stage the firm is in. She finds that book tax differences vary predictably over a firm's life cycle because firms engage in different types of activities at each stage. She also provides evidence that the relationship between large book tax differences and earnings persistence is explained by life cycle.

Tang and Firth (2012) show that abnormal negative and positive book tax spreads can provide incremental information about earnings persistence beyond two measures of earnings management, discretionary accruals and total accruals, encouraging further research on BTDs. Tang and Firth conclude: "Overall, the results suggest that the different components of BTDs have differential implications for earnings quality. Additional tests show that abnormal BTDs and normal BTDs can provide incremental information about earnings persistence beyond the information in discretionary accruals and total accruals, suggesting that the investigation into the components of BTDs adds value to financial analysis."

In summary, there is a substantial body of research that relates BTDs to earnings quality. Some of this research follows the earnings management theme, particularly with regard to positive BTDs, while other research suggests alternative explanations for lower earnings persistence associated with large BTDs. There is less evidence about why lower earnings

persistence is associated with LNBTDs versus LPBTDs and why there is lower persistence of cash flows associated with LPBTDs and LNBTDs.

## III.III. CAPX and R&D

Poterba, Rao, and Seidman (2011) provide detailed information about the composition of BTDs, noting that temporary differences related to depreciation (amortization) are the largest contributors to deferred tax liabilities (deferred tax assets). This is potentially relevant because both investment in CAPX and investment in R&D are associated with future excess returns and stock return volatility (McConnell and Muscarella 1985; Kerstein and Kim 1995; Lev and Sougiannis 1996; Lev et al. 2000; Chan et al. 2001; and Penman and Zhang 2002).

There is substantive outcome risk associated with investments in R&D, leading to earnings volatility and early write-downs and impairments of assets associated with R&D investment. Wedig (1990) finds that there is a significant systematic risk premium associated with R&D. Studies by Griffin (1997) and Keizer, Vol and Halman (2005) document that the failure rate of new product development projects is very high. Shi (2003) demonstrates that from the viewpoint of creditors, R&D risk outweighs benefits. Fast technology change and diverse customer demands make the R&D activity environment even more complex and volatile (Cooper 2006).

In their comparative analysis of the uncertainty of future economic value from investments in R&D, Kothari et al. (2002) regress future earnings variability on current R&D investment and PP&E investment and find that the coefficient on R&D is about three times as large as the coefficient on PP&E investment. Amir et al. (2007) find that R&D contributes to subsequent earnings variability more than CAPX only in relatively R&D-intensive industries. They demonstrate that both R&D and capital investment are relevant for assessing a company's

future profitability and risk profile. In fact, Amir et al. (2007) find no evidence that R&D contributes more than physical assets for the relatively capital intensive industries, instead they find the volatility of subsequent operating profitability is equally influenced by both.

Given the likelihood that large positive BTDs are associated with CAPX and that large negative BTDs are associated with investment in R&D, I casually examine the industry composition of companies that are in the LPBTD, middle BTD and LNBTD quintiles of my sample. Panel A of Table 1 includes the industries that are over-represented in the LNBTD quintile (more than 30% of the industry observations) and Panel B of Table 1 includes the industries that are over-represented in the LPBTD quintile (more than 30% of the industry observations). The LNBTD industries (panel A) are dominated by technology and innovation industries, including telecom, various computer and electronics industries, pharmaceuticals, and bio-tech, whereas the LPBTD industries (panel B) are dominated by heavy asset industries, including oil and gas (refining, exploration and production, drilling) as well as trucking, publishing, paper and forest products, and railroads. The middle BTD industries (panel C) are dominated by retail. This casual analysis strengthens the likelihood of a link between LNBTD and R&D and a link between LPBTD and CAPX.

**Table 1 – BTD Frequency by Industry**

| ***Industry Name*** | **LNBTD** | **SBTD** | **LPBTD** |
|---|---|---|---|
| *Telecommunications (Wireless)* | 100% | 0% | 0% |
| *Computers (Networking)* | 58.5% | 39% | 2.5% |
| *Oil (Domestic Integrated)* | 42% | 35% | 23% |
| *Computers (Peripherals)* | 40% | 41% | 19% |
| *Health Care (Diversified)* | 40% | 39% | 21% |
| *Computers (Software and Services)* | 38% | 43% | 19% |
| *Electronics (Semiconductors)* | 36% | 50% | 14% |

| | | | |
|---|---|---|---|
| *Health Care (Drugs-Major Pharma)* | 35% | 50% | 15% |
| *Equipment (Semiconductors)* | 32% | 56% | 12% |
| *Computers (Hardware)* | 30% | 59% | 11% |
| *Bio Technology* | 30% | 51.5% | 18.5% |
| *Services (Computer Systems)* | 30% | 54% | 16% |

## Table 1 – BTD Frequency by Industry (continued)

| | | | |
|---|---|---|---|
| ***Panel B: LPBTD Sample[2]*** | | | |
| *Oil and Gas (Refining and Marketing)* | 0 | 35% | 65% |
| *Truckers* | 0% | 36% | 64% |
| *Oil and Gas (Exploration and Production)* | 8.5% | 31.5% | 60% |
| *Health Care (Managed Care)* | 4.5% | 45.5% | 50% |
| *Oil and Gas (Drilling and Equipment)* | 10% | 51.5% | 39% |
| *Paper and Forest Products* | 8% | 56.5% | 35.5% |
| *Publishing (Newspapers)* | 6% | 62% | 32% |
| *Railroads* | 6.5% | 61.5% | 32% |
| *Broadcasting (Television and Cable)* | 8% | 61.5% | 31% |
| *Health Care (Hospital Management)* | 13.5% | 56% | 31% |
| *Aerospace/Defense* | 15% | 55% | 30% |
| *Construction (Cement and Aggregates)* | 5% | 65% | 30% |
| | | | |
| ***Panel C: Middle BTD sample[3]*** | | | |
| *Retail (General Merchandise)* | 6% | 91% | 3% |
| *Retail (Food Chains)* | 10.5% | 76% | 14% |
| *Retail (Computers and Electronics)* | 15.5% | 73% | 11.5% |
| *Retail (Department Stores)* | 16.5% | 73% | 10.5% |
| *Retail (Specialty)* | 18% | 67% | 15% |

Table 1 provides a ranking of industries based on the BTD quintiles: LPBTD, Middle BTD (includes the three middle quintiles), and LNBTD. If industries were uniformly distributed across quintiles I would expect a 20%, 60%, 20% allocation.

(1)Industries have been ordered based on the percentage of observations in the LNBTD quintile.

(2)Industries have been ordered based on the percentage of observations in the LPBTD quintile.

(3)Industries have been ordered based on the percentage of observations in the middle BTD quintile.

**Table 2 – Sample Selection**

I follow the Hanlon (2005) procedures for sample selection but expand the time period to include recent years.

I begin with the Compustat annual dataset from 1995 to 2016 including 242,024 observations.

I use 1994 as the starting point because this was the year that ASC 740 (formerly SFAS 109) became effective, which allows all observations to have consistent accounting for the tax variables. I intentionally exclude the years 2017, 2018 and 2019 from the sample time period due to the tax cuts and jobs act of 2017, which lowered the corporate tax rate from 35% to 21%.

I deliberately exclude data from 1994 to control for effects of the starting point.

I drop observations with sic code 4000 to 4999 (utilities).

I drop observations with sic code from 6000 to 6799 (financial services).

I also eliminate firms with missing pre-tax income or pre-tax financial reporting losses (16,408 observations), negative current tax expense or a net operating loss, (71,246 observations).
After deleting observations with missing data, my final sample contains 21,981 firm-year observations and 4,341 firms.
There are 155 observations with missing CAPX from Compustat in my sample, which I keep in my sample, replacing missing values with zero.

There were 8,849 R&D observations with missing values, I replace the missing values with zero.

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***Book Tax reporting and investment in CAPX and R&D***

It is not surprising that HiCAPX firms are prominent in the LPBTD sub-sample because accelerated depreciation for tax purposes causes book income to be higher than taxable income when companies are growing (assuming companies are using straight-line depreciation for book purposes). This may reverse as firms mature if they do not replenish physical capital at a sufficiently high rate to balance the assets on the other side of the book tax depreciation curve. This means that the (*HiCAPX-LPBTD*) intersection is likely made up of capital-intensive companies that are growing their asset base.

The rationale for the concentration of high R&D firms in the LNBTD sub-sample is not as obvious but may arise from a variety of timing differences between book income and taxable income for R&D intensive companies. While both GAAP accounting and U.S. tax rules allow for immediate expensing of R&D, differences in the application of the rules may cause negative book tax differences. Although unlikely, companies may choose to capitalize and amortize R&D expenditures for tax purposes that must be expensed for book purposes. However, some capital assets (those that do not have alternative future uses) that are expensed for book purposes are amortized for tax purposes. Some other expenditures that are expensed for book purposes may not qualify as research expenditures for tax purposes.[15]

Acquisition of intangible assets, in business combinations or otherwise, may lead to permanent or timing differences in the recognition and amortization of acquired intangibles.[16] In acquisitions subject to carry-over provisions for U.S. tax purposes, the acquiring company recognizes the fair value of acquired assets and goodwill for book purposes but retains the tax basis of the target company, which is often negligible, for tax purposes. This creates permanent differences when acquired intangibles are amortized or impaired for book purposes. However, in acquisitions subject to step-up provisions, the acquiring company recognizes the fair value of acquired assets and goodwill for both book purposes and tax purposes. In this case, amortization may differ for book and tax because amortization is based on the estimated useful remaining life for book purposes and is prescribed for tax purposes. Negative book tax differences occur if book amortization is faster than tax amortization.

R&D intensive companies typically have short product life cycles and face more demand uncertainty for their products, meaning that they often write down assets for book purposes

[15] In this regard, R&D tax credits should not matter because I am focused on timing differences.
[16] My analysis of BTDs is based on timing differences.

before they realize the loss in value for tax purposes.[17] Similarly, impairment of goodwill and other intangibles may be recorded earlier for book purposes than it is recognized for tax purposes. Other reserves such as allowances for bad debts or warranty provisions may cause earlier expense recognition for book than tax purposes. R&D intensive companies may also defer revenues for book purposes that must be recognized for tax purposes. Finally, because R&D intensive companies rely less on physical assets, their BTDs are less positive due to relatively lower capital expenditures.

***Hypotheses***

I follow the pattern set by Blaylock et al. (2012) who formed quintiles based on high discretionary accruals (HiDA) and high tax avoidance to investigate whether lower earnings persistence among LPBTD firms could be attributed to earnings management or tax avoidance. However, in addition to sorting firm-year observations on discretionary accruals, I sort firm-year observations into quintiles based on CAPX and R&D (both deflated by total assets). Moreover, the question I address is different from the question addressed by Blaylock et al. (2012) who focused on explaining earnings persistence for LPBTD firms only. I address the question whether differences in earnings persistence between the large BTD quintiles and the middle BTD quintiles may be attributed to discretionary accruals (HiDA) or investments in CAPX (HiCAPX) and R&D (HiR&D).

*H1: Differences in earnings persistence between the large BTD quintiles and the middle BTD quintiles are associated with high discretionary accruals* (*HiDA*).

*H2: Differences in earnings persistence between the large BTD quintiles and the middle BTD quintiles are associated with high investment expenditures* (*HiCAPX and HiR&D*).

[17] R&D intensive companies typically have a portfolio of projects, meaning that some projects are being closed down while new projects are coming online.

In fact, there are two ways that an attribute (HiDA, HiCAPX or HiR&D) may contribute to the Hanlon (2005) results that LPBTD or LNBTD firms have lower earnings persistence than middle BTD quintile firms. One way is if the attribute itself leads to lower earnings persistence generally and is over-represented in the LPBTD or LNBTD firms. The other way is if there is an interaction effect between LPBTD or LNBTD and the attribute itself. This second way may be stated as a question. Is there something about the combination of LPBTD and the attribute or LNBTD and the attribute that leads to lower earnings persistence? I know, for instance, that capital-intensive firms that are growing will have higher positive BTDs than capital intensive firms that are mature. So, one possibility is that the combination of LPBTD and HiCAPX signifies a growth firm making high capital investments. This is relevant because the combination of growth and CAPX may lead to high outcome uncertainty from investment and lower earnings persistence. Similarly, the combination of LNBTD and HiR&D may signify an R&D-intensive firm that is aggressively developing new products. In this case, lower earnings persistence would be due to the uncertainty of new products. I perform a series of tests to examine the two hypotheses.

## III.IV. Empirical Models

First, I investigate whether specific attributes (HiDA, HiCAPX, and HiR&D) are over-represented in either or both of the large BTD quintiles by comparing the frequencies of HiDA, HiCAPX and HiR&D firms across the BTD quintiles. As described above, higher than expected frequency does not necessarily indicate that the difference in persistence of LPBTD and LNBTD firms is due to a specific attribute.

To examine the association between the attributes and earnings persistence, I begin with a basic earnings persistence model (equation 1) that relates pre-tax book income in t+1 ($PTBI_{t+1}$)

to $PTBI_t$. Then, similar to Blaylock et al. (2012), I add the attributes (HiDA, HiR&D and HiCAPX) and interactions between $PTBI_t$ and the three attributes (equation 2). I estimate the model for my full sample and separately for observations in the LPBTD quintile, the middle BTD quintiles and the LNBDT quintile.

$$PTBI_{t+1}=\delta_0+\delta_1 PTBI_t+\varepsilon_{t+1} \quad (1)$$

$$PTBI_{t+1}=\delta_0+\delta_1 PTBI_t+\delta_2 HiDA+\delta_3 HiDA\times PTBI_t+\delta_4 HiR\&D+\delta_5 HiCAPX+\delta_6 HiR\&D\times PTBI_t$$
$$+\delta_7 HiCAPX\times PTBI_t+\varepsilon_{t+1} \quad (2)$$

I also estimate variations of the above models that include pre-tax cash flows ($PTCF_t$) and pre-tax accruals ($PTACC_t$) as independent variables in place of $PTBI_t$ (equations 3 and 4).

$$PTBI_{t+1}=\delta_0+\delta_1 PTCF_t+\delta_2 PTACC_t+\varepsilon_{t+1} \quad (3)$$

$$PTBI_{t+1}=\delta_0+\delta_1 PTCF_t+\delta_2 PTACC_t+\delta_3 HiDA+\delta_4 HiDA\times PTCF_t+\delta_5 HiDA\times PTACC_t+\delta_6 HiR\&D$$
$$+\delta_7 HiCAPX+\delta_8 HiR\&D\times PTCF_t+\delta_9 HiR\&D\times PTACC_t+\delta_{10} HiCAPX\times PTCF_t$$
$$+\delta_{11} HiCAPX\times PTACC_t+\varepsilon_{t1} \quad (4)$$

In my models, PTBI represents pre-tax book income, scaled by average total assets. To estimate book tax differences, I calculate the deferred tax expense as the sum of federal and foreign deferred taxes (Compustat variables TXDFED and TXDFO respectively). If either federal or foreign deferred taxes are missing, total deferred taxes are used instead (Compustat variable TXDI), following Hanlon (2005). Book tax differences are calculated by grossing up the deferred tax expense by the statutory tax rate, which is 35 percent in all sample years. Book tax differences are then scaled by average assets. LNBTD is a dummy variable, which is equal to one for firm-years with scaled temporary book tax differences in the lowest quintile of firms in each year, and zero otherwise. Similarly, LPBTD is a dummy variable, which is equal to one

for firm-years with scaled temporary book tax differences in the highest quintile of firms in each year, and zero otherwise. Following Hanlon (2005) I also separate earnings into its accrual and cash flow components. I measure pre-tax cash flows (PTCF) as the sum of total operating cash flows (Compustat variable OANCF) and taxes paid in cash (Compustat variable TXPD), less cash flow due to extraordinary items (Compustat variable XIDOC). Pre-tax accruals (PTACC) are measured as the difference between pre-tax book income (PTBI) and pre-tax cash flows (PTCF). Both PTCF and PTACC are scaled by average assets.

I reproduce Hanlon's (2005) model by introducing interactions for firms with large positive and negative book tax differences (firms in the top and bottom BTD quintiles). The following two equations represent the basic Hanlon (2005) model and the expanded model used to examine the persistence of pre-tax cash flows and accruals.

$$PTBI_{t+1}=\delta_0+\delta_1 PTBI_t+\delta_2 LNBTD+\delta_3 LPBTD+\delta_4 LNBTD\times PTBI_t+\delta_5 LPBTD\times PTBI_t+\varepsilon_{t+1} \quad (5)$$

$$PTBI_{t+1}=\delta_0+\delta_1 PTCF_t+\delta_2 PTACC_t+\delta_3 LNBTD+\delta_4 LPBTD+\delta_5 LNBTD\times PTCF_t+\delta_6 LPBTD\times PTCF_t$$
$$+\delta_7 LNBTD\times PTACC_t+\delta_8 LPBTD\times PTACC_t+\varepsilon_{t+1} \quad (6)$$

After reproducing the Hanlon (2005) models, I expand equations 5 (and 6) to incorporate two-way interactions between PTBI (or PTCF and PTACC) and HiDA and three-way interactions between LNBTD or LPBTD, PTBI, and HiDA. Equations 7 and 8 represent an intermediate step in my analysis where I examine the implications of earnings management before I add the investment variables.

$$PTBI_{t+1}= \delta_0+\delta_1 PTBI_t+\delta_2 LNBTD+\delta_3 LPBTD+\delta_4 LNBTD\times PTBI_t+\delta_5 LPBTD\times PTBI_t$$
$$+\delta_6 HiDA\times LNBTD+\delta_7 HiDA\times LPBTD+\delta_8 HiDA\times PTBI+\delta_9 HiDA\times PTBI\times LNBTD$$
$$+\delta_{10} HiDA\times PTBI\times LPBTD+\varepsilon_{t+1} \quad (7)$$

$$PTBI_{t+1}=\delta_0+\delta_1 PTCF_t+\delta_2 PTACC_t+\delta_3 LNBTD+\delta_4 LPBTD+\delta_5 LNBTD\times PTCF_t+\delta_6 LPBTD\times PTCF_t$$
$$+\delta_7 LNBTD\times PTACC_t+\delta_8 LPBTD\times PTACC_t+\delta_9 HiDA+\delta_{10} HiDA\times LNBTD+\delta_{11} HiDA\times LPBTD$$
$$+\delta_{12} HiDA\times PTCF_t+\delta_{13} HiDA\times PTACC_t+\delta_{14} HiDA\times PTCF_t\times LNBTD+\delta_{15} HiDA\times PTCF_t\times LPBTD$$
$$+\delta_{16} HiDA\times PTACC_t\times LNBTD+\delta_{17} HiDA\times PTACC_t\times LPBTD+\varepsilon_{t+1} \quad (8)$$

Finally, I expand equations 7 (and 8) to include two-way interactions between PTBI (or PBCF and PBACC) and HiR&D or HiCAPX and three-way interactions between LNBTD or LPBTD, HiR&D or HiCAPX and PTBI.

$$PTBI_{t+1}=\delta_0+\delta_1 PTBI_t+\delta_2 LNBTD+\delta_3 LPBTD+\delta_4 LNBTD\times PTBI_t+\delta_5 LPBTD\times PTBI_t+\delta_6 HiDA\times LNBTD$$
$$+\delta_7 HiDA\times LPBTD+\delta_8 HiDA\times PTBI_t+\delta_9 HiDA\times PTBI_t\times LNBTD+\delta_{10} HiDA\times PTBI_t\times LPBTD+\delta_{11} HiR\&D$$
$$+\delta_{12} HiCAPX+\delta_{13} HiR\&D\times LNBTD+\delta_{14} HiCAPX\times LNBTD+\delta_{15} HiR\&D\times LPBTD+\delta_{16} HiCAPX\times LPBTD$$
$$+\delta_{17} HiR\&D\times PTBI_t+\delta_{18} HiCAPX\times PTBI_t+\delta_{19} HiR\&D\times PTBI_t\times LNBTD+\delta_{20} HiR\&D\times PTBI_t\times LPBTD$$
$$+\delta_{21} HiCAPX\times PTBI_t\times LNBTD+\delta_{22} HiCAPX\times PTBI_t\times LPBTD+\varepsilon_{t+1} \quad (9)$$

$$PTBI_{t+1}=\delta_0+\delta_1 PTCF_t+\delta_2 PTACC_t+\delta_3 LNBTD+\delta_4 LPBTD+\delta_5 LNBTD\times PTCF_t+\delta_6 LPBTD\times PTCF_t$$
$$+\delta_7 LNBTD\times PTACC_t+\delta_8 LPBTD\times PTACC_t+\delta_9 HiDA+\delta_{10} HiDA\times LNBTD+\delta_{11} HiDA\times LPBTD$$
$$+\delta_{12} HiDA\times PTCF_t+\delta_{13} HiDA\times PTACC_t+\delta_{14} HiDA\times PTCF_t\times LNBTD+\delta_{15} HiDA\times PTCF_t\times LPBTD$$
$$+\delta_{16} HiDA\times PTACC_t\times LNBTD+\delta_{17} HiDA\times PTACC_t\times LPBTD+\delta_{18} HiR\&D+\delta_{19} HiCAPX$$
$$+\delta_{20} HiR\&D\times LNBTD+\delta_{21} HiR\&D\times LPBTD+\delta_{22} HiCAPX\times LNBTD+\delta_{23} HiCAPX\times LPBTD$$
$$+\delta_{24} HiR\&D\times PTCF_t+\delta_{25} HiR\&D\times PTACC_t+\delta_{26} HiCAPX\times PTCF_t+\delta_{27} HiCAPX\times PTACC_t$$
$$+\delta_{28} HiR\&D\times PTCF_t\times LNBTD+\delta_{29} HiR\&D\times PTCF_t\times LPBTD+\delta_{30} HiCAPX\times PTCF_t\times LNBTD$$
$$+\delta_{31} HiCAPX\times PTCF_t\times LPBTD+\delta_{32} HiR\&D\times PTACC_t\times LNBTD+\delta_{33} HiR\&D\times PTACC_t\times LPBTD$$
$$+\delta_{34} HiCAPX\times PTACC_t\times LNBTD+\delta_{35} HiCAPX\times PTACC_t\times LPBTD+\varepsilon_{t+1} \quad (10)$$

***Data and Empirical Results***

I follow the procedures in Hanlon (2005) when selecting my sample but expand the time period to include more recent years. I use 1994 as the starting point because this was the year

that ASC 740 (formerly SFAS 109) became effective, which allows all observations to have consistent accounting for the tax variables. I begin with the Compustat annual dataset from 1995 to 2016 including 242,024 observations (see table 2). I deliberately exclude data from 1994 to control for effects of the starting point. I eliminate utilities and financial services firms and firms not incorporated in the U.S. I also eliminate firms with missing pre-tax income or pre-tax financial reporting losses, negative current tax expense or a net operating loss. After deleting observations with missing data, my final sample contains 21,981 firm-year observations and 4,341 firms. It is worth pointing out that I replaced missing values of R&D with zeros for 8,849 observations and missing values of CAPX with zeros for 155 observations.

Table 3 provides an estimation of a logistic model (panel A) to evaluate the significance of the association between the large BTDs and CAPX or R&D intensity. The logit models relate the LNBTD, middle BTD and LPBTD dummy variables to continuous CAPX and R&D variables. The empirical results are informative about the relative importance of R&D intensity and CAPX in the LNBTD and LPBTD quintiles respectively. For the LNBTD model, there is a strong positive association between LNBTD and R&D (coefficient = 8.05, Z-stat = 22.91) and a negative association between LNBTD and CAPX (coefficient = -1.55, Z-stat = -5.00). The reverse holds true for the LPBTD model. There is a strong positive association between LPBTD and CAPX (coefficient = 5.22, Z-stat = 9.69) and a negative association between LPBTD and R&D (coefficient = -2.26, Z-stat = -5.12).

**Table 3 – Associations between LPBTD or LNBTD, CAPX and R&D**

**Panel A: Logit Regression of BTD dummy variables on CAPX and R&D**

| ***Variables*** | ***LNBTD*** | ***Z-stat*** | ***Middle BTD*** | ***Z-stat*** | ***LPBTD*** | ***Z-stat*** |
|---|---|---|---|---|---|---|
| *CAPX* | -1.55*** | -5.00 | -3.36*** | -14.78 | 5.22*** | 9.69 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *R&D* | 8.05*** | 22.91 | -5.22*** | -15.76 | -2.26*** | -5.12 |
| *Pseudo-$R^2$* | 2.6% | | 1.5% | | 2.3% | |
| *N* | 21,826 | | 21,826 | | 21,826 | |

*, **, *** represent statistical significance level at 10 percent, 5 percent and 1 percent levels

Table 4 provides a matrix that compares the frequency of HiCAPX, HiDA and HiR&D observations with the expected frequency (assuming uniform distributions) in the various BTD quintiles. Two numbers stand out – the high frequency of HiCAPX firms in the LPBTD quintile (1,333 firms versus expected frequency of 879, $Chi^2$ of difference is 234) and the high frequency of HiR&D firms in the LNBTD quintile (1403 firms versus expected frequency of 879, $Chi^2$ of difference is 312). On the other hand, I see that the HiDA firms are almost uniformly distributed across the BTD quintiles. The HiDA firms are slightly over-represented in the large BTD quintiles (923 versus expected frequency of 879 in the LPBTD quintile and 954 versus expected frequency of 879 in the LNBTD quintile) but these concentrations are not nearly as strong as the concentrations of HiCAPX in the LPBTD and HiR&D in the LNBTD quintiles respectively.

**Table 4 - Frequency Matrix**

| Sub Sample | HiCAPX | HiDA | HiR&D |
|---|---|---|---|
| *LPBTD* | 1,333(1)<br>879(2)<br>30%(3)<br>234(4) | 923<br>879<br>21%<br>2.2 | 715<br>879<br>16.3%<br>31 |
| *Middle BTD* | 2,314<br>2,637<br>53%<br>40 | 2,519<br>2,638<br>57.3%<br>5.4 | 2,278<br>2,638<br>52%%<br>49 |
| *LNBTD* | 749<br>879<br>17%<br>19 | 954<br>879<br>22%<br>6.4 | 1,403<br>879<br>32%<br>312 |

(1) The first number shows the actual number of observations
(2) The second number represents the expected frequency if uniformly distributed
(3) The third number shows the percentage of observations in the cell
(4) The fourth number represents the $Chi^2$ value of the difference between actual and expected frequency

The higher frequencies would make a difference by themselves if lower earnings persistence associated with HiCAPX or HiR&D were general across the BTD quintiles. If this were the case, then the Hanlon (2005) results could be credited to larger concentrations of HiCAPX and HiR&D in the LPBTD and LNBTD quintiles respectively. I examine whether this holds below.

I present the descriptive statistics for the full sample, the LNBTD sample and LPBTD sample in panels A, B and C of table 5. These panels confirm the higher R&D intensity in the LNBTD sample (mean = 0.037) versus the full sample (mean = 0.022) and the LPBTD sample (mean = 0.018), and the higher CAPX value in the LPBTD sample (mean = 0.081) versus the full sample (mean = 0.061) and the LNBTD sample (mean = 0.054). The mean value of discretionary accruals is very close to zero for the full sample (mean value = 3.5e-11), is slightly negative for the LNBTD sample (-0.0055) and is slightly positive for the LPBTD sample (0.0099).

## Table 5 - Descriptive Statistics

**Panel A: Descriptive Statistics of the Full Sample**

| Variable | Mean | StD | 25th | Median | 75th | N |
|---|---|---|---|---|---|---|
| *CAPX* | .0611 | .0628 | .0225 | .0426 | .0770 | 21826 |
| *R&D* | .0222 | .0434 | 0 | 0 | .0261 | 21981 |
| *DA* | 3.5e-11 | .3880 | -.0750 | -.0274 | .0295 | 21981 |
| *BTD* | .0064 | .0429 | -.0111 | .0029 | .0205 | 21981 |
| *PTACC* | -.0260 | .0886 | -.0697 | -.0336 | .0057 | 21981 |
| *PTCF* | .1632 | .1208 | .0919 | .1485 | .2186 | 21981 |
| *MB* | 1.65 | 19.52 | 0 | 0 | 2.18 | 21981 |
| *Volatility* | .0391 | .0419 | .0143 | .0272 | .0489 | 16815 |

**Panel B: Descriptive Statistics of the LNBTD Sample**

| Variable | Mean | StD | 25th | Median | 75th | N |
|---|---|---|---|---|---|---|
| *CAPX* | .0554 | .0495 | .0223 | .0419 | .0725 | 4363 |
| *R&D* | .0371 | .0594 | 0 | .0063 | .0573 | 4395 |
| *DA* | -.0055 | .4557 | -.0919 | -.0355 | .0344 | 4395 |
| *BTD* | -.0399 | .0356 | -.0450 | -.0291 | -.0212 | 4395 |
| *PTACC* | -.0327 | .1038 | -.0880 | -.0428 | .0080 | 4395 |
| *PTCF* | .1939 | .1415 | .1113 | .1737 | .2589 | 4395 |
| *MB* | 1.33 | 14.93 | 0 | 0 | 2.15 | 4395 |
| *Volatility* | .048 | .048 | .017 | .034 | .062 | 3286 |

**Panel C: Descriptive Statistics of the LPBTD Sample**

| Variable | Mean | StD | 25th | Median | 75th | N |
|---|---|---|---|---|---|---|
| *CAPX* | .0811 | .0853 | .0268 | .0518 | .1033 | 4360 |
| *R&D* | .0181 | .0388 | 0 | 0 | .0174 | 4396 |
| *DA* | .0099 | .6853 | -.0820 | -.0278 | .0336 | 4396 |
| *BTD* | .0609 | .0494 | .0335 | .0450 | .0684 | 4396 |
| *PTACC* | -.0253 | .0912 | -.0716 | -.0340 | .0091 | 4396 |
| *PTCF* | .1699 | .1173 | .0993 | .1561 | .2244 | 4396 |
| *MB* | 2.36 | 24.05 | 0 | 1.67 | 3.05 | 4396 |
| *Volatility* | .0437 | .0461 | .0166 | .0308 | .0543 | 3137 |

Please refer to Appendix A for variable definitions.

Table 6 provides descriptive statistics for the HiDA, HiCAPX, and HiR&D sub-samples respectively. Of interest here as well are the values of the continuous variables DA, CAPX and R&D in the three sub-samples. DA is 0.240 in the HiDA sub-sample, -0.046 in the HiR&D sub-sample and 0.029 in the HiCAPX sub-sample. CAPX is 0.158 in the HiCAPX sub-sample, 0.047 in the HiDA sub-sample and 0.049 in the HiR&D sub-sample. R&D is 0.092 in the HiR&D sub-sample, 0.029 in the HiDA sub-sample and 0.015 in the HiCAPX sub-sample. This indicates that there are not high cross-correlations between the sub-samples with respect to the three primary attributes of interest in my analysis. The mean value of BTD is 0.015 in the HiCAPX sub-sample, 0.008 in the HiDA sub-sample and -0.002 in the HiR&D sample.

**Table 6 - Descriptive Statistics**

**Panel A: Descriptive Statistics of the High Discretionary Accruals Quintile**

| Variable | Mean | StD | 25th | Median | 75th | N |
|---|---|---|---|---|---|---|
| *CAPX* | 0.047 | 0.057 | 0.014 | 0.031 | 0.059 | 4,360 |
| *R&D* | 0.029 | 0.053 | 0 | 0 | 0.042 | 4,396 |
| *BTD* | 0.008 | 0.058 | -0.013 | 0.001 | 0.019 | 4,396 |
| *PTACC* | 0.073 | 0.119 | 0.012 | 0.059 | 0.114 | 4,396 |
| *PTCF* | 0.098 | 0.143 | 0.018 | 0.085 | 0.168 | 4,396 |
| *DA* | 0.240 | 0.532 | 0.085 | 0.140 | 0.251 | 4,396 |
| *MB* | 3.314 | 21.143 | 1.206 | 1.893 | 3.248 | 1,613 |
| *Volatility* | 0.049 | 0.051 | 0.018 | 0.035 | 0.064 | 2,838 |
| *Depreciation* | 0.028 | 0.023 | 0.014 | 0.024 | 0.036 | 4,384 |

## Table 6 - Descriptive Statistics (continued)

**Panel B: Descriptive Statistics of the High Capital Expenditure Quintile**

| Variable | Mean | StD | 25th | Median | 75th | N |
|---|---|---|---|---|---|---|
| *CAPX* | 0.158 | 0.080 | 0.106 | 0.131 | 0.182 | 4,241 |
| *R&D* | 0.015 | 0.041 | 0 | 0 | 0.005 | 4,396 |
| *BTD* | 0.015 | 0.048 | -0.007 | 0.009 | 0.033 | 4,396 |
| *PTACC* | -0.052 | 0.085 | -0.096 | -0.055 | -0.015 | 4,396 |
| *PTCF* | 0.210 | 0.125 | 0.131 | 0.194 | 0.272 | 4,396 |
| *DA* | -0.046 | 0.322 | -0.122 | -0.071 | -0.010 | 4,396 |
| *MB* | 3.852 | 31.188 | 1.654 | 2.559 | 4.022 | 2,143 |
| *Volatility* | 0.043 | 0.046 | 0.0146 | 0.029 | 0.054 | 3,210 |
| *Depreciation* | 0.062 | 0.039 | 0.040 | 0.055 | 0.076 | 4,384 |

**Panel C: Descriptive Statistics of the High Research & Development Quintile**

| Variable | Mean | StD | 25th | Median | 75th | N |
|---|---|---|---|---|---|---|
| *CAPX* | 0.049 | 0.043 | 0.021 | 0.038 | 0.064 | 4354 |
| *R&D* | 0.092 | 0.054 | 0.054 | 0.077 | 0.112 | 4396 |
| *BTD* | -0.002 | 0.053 | -0.021 | -0.003 | 0.015 | 4396 |
| *PTACC* | -0.024 | 0.090 | -0.071 | -0.031 | 0.013 | 4396 |
| *PTCF* | 0.187 | 0.126 | 0.110 | 0.170 | 0.248 | 4396 |
| *DA* | 0.029 | 0.239 | -0.063 | -0.0154 | 0.058 | 4396 |
| *MB* | 4.27 | 7.41 | 1.97 | 3.16 | 5.20 | 1767 |
| *Volatility* | 0.048 | 0.050 | 0.018 | 0.035 | 0.063 | 3178 |
| *Depreciation* | 0.038 | 0.022 | 0.023 | 0.034 | 0.048 | 4387 |

Table 7 provides a correlation matrix for the full sample. CAPX is positively correlated with BTD, R&D is negatively correlated with BTD, and DA is not highly correlated with BTD. CAPX is negatively correlated with R&D and pre-tax accruals (PTACC). R&D is positively correlated with pre-tax accruals. Both CAPX and R&D are positively correlated with pre-tax book income (PTBI) and pre-tax cash flows (PTCF).

**Table 7 - Pairwise Correlations**

**(Pearson above and Spearman below the Diagonal)**

| **Variable** | *CAPX* | *R&D* | *DA* | *BTD* | *PTBI* | *PTACC* | *PTCF* | *Vol.* | *M/B* |
|---|---|---|---|---|---|---|---|---|---|
| *CAPX* | | -0.082* | **-0.077*** | **0.151*** | 0.103* | -0.191* | 0.229* | **0.035*** | 0.002 |
| *R&D* | -0.107* | | **0.04*** | **-0.136*** | 0.136* | -0.011 | 0.127* | **0.121*** | 0.000 |
| *DA* | **-0.325*** | **0.110*** | | **0.034*** | 0.082* | 0.328* | -0.169* | 0.059* | -0.006 |
| *BTD* | **0.102*** | **-0.133*** | **0.016*** | | 0.021* | 0.078* | -0.039* | 0.01* | 0.025* |
| *PTBI* | 0.151* | 0.116* | 0.120* | -0.028* | | 0.231* | 0.701* | 0.316* | 0.039* |
| *PTACC* | -0.213* | 0.037* | 0.827* | 0.039* | 0.167* | | -0.532* | 0.022* | -0.011 |
| *PTCF* | 0.264* | 0.083* | **-0.462*** | -0.057* | 0.674* | -0.530* | | 0.256* | 0.043* |
| *Vol.* | 0.003 | **0.109*** | 0.028* | -0.043* | 0.227* | -0.035* | 0.222* | | 0.018 |
| *M/B* | 0.029* | -0.026* | -0.126* | 0.188* | 0.163* | -0.098* | 0.206* | 0.134* | |

All variable definitions can be found in Appendix A.Numbers with * represent statistical significance at the 1 percent level, numbers with + represent statistical significance at the 5 percent level, and numbers with # represent statistical significance at the 10 percent level. Correlations of particular importance are in bold font.

This sets up my main analysis that examines how the three attributes of interest are associated with earnings persistence and whether they are deferentially associated with earnings persistence across the different BTD quintiles. Similar to Blaylock et al. (2012), I first estimate an earnings persistence model for pre-tax book income (PTBI) that includes three binary variables Hi-DA, HiCAPX and HiR&D (table 8, panel A). I estimate the model for the full sample and for the separate BTD sub-samples. The variables of interest here are the two-way interactions between PTBI and the three attributes, (*HiDA-PTBI)*, (*HiR&D-PTBI)*, and (*HiCAPX-PTBI)*.

For the results reported in table 8, panel A, I note that (*HiDA-PTBI)* is significantly negative (reduces earnings persistence) in the full sample (coefficient = -0.254) and in each of the sub-samples (coefficients = -0.167, -0.265, and -0.289 in the LNBTD, LPBTD and middle BTD sub-samples respectively). The high potency of discretionary accruals in the LPBTD sub-

sample is consistent with the Blaylock et al. (2012) findings. But HiDA is also potent in the other sub-samples, especially the middle BTD sub-sample.[18] (*HiR&D-PTBI)* is significantly negative in the full sample (coefficient = -0.079) but is only significantly negative in the LNBTD sub-sample (coefficient = -0.183) and not in the LPBTD and middle BTD sub-samples. (*HiCAPX-PTBI)* is significantly negative in the full sample (coefficient = -0.065) and is significantly negative and large in magnitude in the LPBTD sub-sample (coefficient = -0.179) and is marginally significant and small in magnitude in the middle BTD sub-sample (coefficient = -0.025). Two important things come to light in this analysis that will be examined further below. One is the high potency of high discretionary accruals in all of the sub-samples. The other is the result that high R&D is only potent in the LNBTD sub-sample and high CAPX is much more potent in the LPBTD sub-sample than in other sub-samples.

Panel B of table 8 presents a similar analysis for persistence of earnings separated between cash flows and accruals. There are many interesting findings here as well. For the full sample, the coefficients of (*HiDA-PTCF)* and (*HiDA-PTACC)* are similar indicating that high discretionary accruals are associated with lower persistence of both cash flows and accruals. For cash flows, I seem more uniformity across the BTD sub-samples than for accruals. Lower earnings persistence is associated more with cash flows than accruals for the LNBTD sub-sample and more with accruals than cash flows for the middle BTD sub-sample. The coefficients on (*HiR&D-PTCF)* and (*HiR&D-PTACC)* are also both significantly negative for the full sample and both are concentrated in the LNBTD sub-sample. Similarly, the coefficients on (*HiCAPX-PTCF)* and (*HiCAPX-PTACC)* are both significantly negative and concentrated in the LPBTD sub-sample.

[18] I do not provide statistical tests of individual coefficients across the sub samples because I will address this in models estimated below.

## Table 8 - Earnings Persistence Models

**Panel A: Interactions between pretax book income and my three variables of interest: high discretionary accruals, high CAPX, and high R&D in the three BTD subsets.**

$$PTBI_{t+1}=\delta_0+\delta_1 PTBI_t+\delta_2 HiDA+\delta_3 HiDA\times PTBI_t+\delta_4 HiR\&D+\delta_5 HiCAPX+\delta_6 HiR\&D\times PTBI_t+\delta_7 HiCAPX\times PTBI_t+\varepsilon_{t+1}$$

| Variables | Full Sample | t-stat | LNBTD | t-stat | LPBTD | t-stat | Middle BTD | t-stat |
|---|---|---|---|---|---|---|---|---|
| *PTBI* | 0.803*** | 123.85 | 0.792*** | 49.40 | 0.800*** | 46.70 | 0.802*** | 108.21 |
| *HiDA* | 0.028*** | 14.97 | 0.012** | 2.29 | 0.028*** | 6.26 | 0.033*** | 16.52 |
| *HiDA-PTBI* | -0.254*** | -26.98 | -0.167*** | -7.08 | -0.265*** | -11.79 | -0.289*** | -25.92 |
| *HiR&D* | 0.016*** | 8.30 | 0.031*** | 6.49 | 0.006 | 1.16 | 0.001*** | 2.59 |
| *HiCAPX* | 0.004** | 2.07 | 0.006 | 0.99 | 0.017*** | 4.07 | -0.000 | -0.37 |
| *HiR&D-PTBI* | -0.079*** | -7.84 | -0.183*** | -8.05 | -0.029 | -1.14 | -0.018 | -1.45 |
| *HiCAPX-PTBI* | -0.065*** | -6.18 | -0.032 | -1.19 | -0.179*** | -7.81 | -0.025* | -1.95 |
| *Intercept* | 0.022*** | 22.16 | 0.032*** | 10.86 | 0.020*** | 7.64 | 0.021*** | 19.24 |
| $R^2$ *(%)* | 53.83 | | 47.80 | | 45.95 | | 59.90 | |
| *N* | 21,981 | | 4,395 | | 4,396 | | 13,190 | |

## Table 8 - Earnings Persistence Models (continued)

**Panel B: Interactions between pretax cash flows and accruals and my three variables of interest: high discretionary accruals, high CPAX, and high R&D in the three BTD subsets.**

$$PTBI_{t+1}=\delta_0+\delta_1 PTCF_t+\delta_2 PTACC_t+\delta_3 HiDA+\delta_4 HiDA\times PTCF_t+\delta_5 HiDA\times PTACC_t+\delta_6 HiR\&D+\delta_7 HiCAPX+\delta_8 HiR\&D\times PTCF_t+\delta_9 HiR\&D\times PTACC_t+\delta_{10} HiCAPX\times PTCF_t+\delta_{11} HiCAPX\times PTACC_t+\varepsilon_{t+1}$$

| Variables | Full Sample | t-stat | LNBTD | t-stat | LPBTD | t-stat | Middle BTD | t-stat |
|---|---|---|---|---|---|---|---|---|
| *PTCF* | 0.814*** | 125.62 | 0.803*** | 49.48 | 0.811*** | 46.96 | 0.817*** | 111.14 |
| *PTACC* | 0.654*** | 56.22 | 0.619*** | 21.19 | 0.659*** | 22.87 | 0.688*** | 51.41 |
| *HiDA* | 0.039*** | 20.53 | 0.03*** | 5.14 | 0.037*** | 7.97 | 0.042*** | 20.56 |
| *HiDA-PTCF* | -0.204*** | -20.81 | -0.150*** | -6.16 | -0.219*** | -9.33 | -0.221*** | -19.21 |
| *HiDA-PTACC* | -0.231*** | -16.12 | -0.075** | -2.05 | -0.244*** | -7.29 | -0.315*** | -18.85 |
| *HiR&D* | 0.016*** | 7.80 | 0.025*** | 4.84 | 0.012** | 2.20 | 0.008*** | 3.23 |
| *HiCAPX* | 0.003 | 1.43 | 0.007 | 1.06 | 0.010** | 2.27 | 0.000 | 0.34 |
| *HiR&D-PTCF* | -0.091*** | -8.78 | -0.167*** | -7.08 | -0.064** | -2.41 | -0.042*** | -3.31 |
| *HiR&D-PTACC* | -0.067*** | -4.66 | -0.201*** | -6.43 | 0.059 | 1.62 | -0.009 | -0.51 |
| *HiCAPX-PTCF* | -0.074*** | -6.98 | -0.044 | -1.57 | -0.173*** | -7.37 | -0.042*** | -3.23 |
| *HiCAPX-PTACC* | -0.036** | -2.34 | 0.021 | 0.53 | -0.170*** | -5.43 | 0.012 | 0.62 |
| *Intercept* | 0.014*** | 12.72 | 0.020*** | 5.85 | 0.014*** | 4.73 | 0.014*** | 11.91 |
| $R^2$ *(%)* | 55.16 | | 48.80 | | 47.28 | | 61.51 | |
| *N* | 21,981 | | 4,395 | | 4,396 | | 13,190 | |

*, **, *** represent statistical significance level at 10 percent, 5 percent and 1 percent level

Next, I move to my analysis that employs the Hanlon (2005) model in table 9. In the first column of table 9, I replicate the Hanlon results that earnings persistence is significantly lower for firms in the LNBTD and LPBTD quintiles (coefficients of -0.039 and -0.075 on *LNBTD-PTBI* and *LPBTD-PTBI* respectively). In the middle column, I keep all of the variables in the basic Hanlon model and add interactions with HiDA (including two-way interactions with PTBI and LNBTD/LPBTD and three-way interactions (*HiDA-PTBI-LNBTD)* and *(HiDA-PTBI-LPBTD*). This is useful because the three-way interactions should pick up the differential effect of HiDA on earnings persistence between the middle BTD quintiles and the LNBTD and LPBTD quintiles respectively. I note that the two-way interaction (*HiDA-PTBI)* that represents the middle BTD quintiles is significantly negative (coefficient = -0.286), consistent with my findings in table 8. However, both of the three-way interactions, (*HiDA-PTBI-LNBTD)* and *(HiDA-PTBI-LPBTD)* are significantly positive (coefficients = 0.088 and 0.046, p-values of 0.01 and 0.10 respectively). This indicates that the combinations of HiDA and LNBTD or HiDA and LPBTD do not have a negative incremental effect on earnings persistence. In other words, HiDA is not associated with lower earnings persistence in the LNPTD and LPBTD quintiles than in the middle BTD quintiles. I also note that the basic (*LNBTD-PTBI)* and (*LPBTD-PTBI)* interactions (Hanlon 2005) retain their magnitudes and significance in the middle column (the HiDA model) versus the first column (the basic model).

**Table 9 - Earnings Persistence Models with LNBTD and LPBTD Interactions**

| Variables | Hanlon | t-stat | HiDA | t-stat | HiDA, HiR&D, HiCAPX | t-stat |
|---|---|---|---|---|---|---|
| *PTBI* | 0.697*** | 113.82 | 0.792*** | 107.69 | 0.802*** | 91.56 |
| *LNBTD* | 0.017*** | 9.10 | 0.021*** | 9.49 | 0.012*** | 4.67 |
| *LPBTD* | 0.007*** | 3.53 | 0.006*** | 2.73 | -0.000 | -0.03 |
| *LNBTD-PTBI* | -0.039*** | -3.91 | -0.059*** | -4.78 | -0.010 | -0.69 |
| *LPBTD-PTBI* | -0.075*** | -6.29 | -0.070*** | -4.70 | -0.002 | -0.14 |
| *HiDA* | | | 0.034*** | 14.06 | 0.033*** | 13.98 |
| *HiDA-LNBTD* | | | -0.016*** | -3.39 | -0.021*** | -4.36 |
| *HiDA-LPBTD* | | | -0.007 | -1.39 | -0.005 | -1.03 |
| *HiDA-PTBI* | | | -0.286*** | -21.89 | -0.289*** | -21.93 |
| *HiDA-PTBI-LNBTD* | | | 0.088*** | 4.07 | 0.121*** | 5.51 |
| *HiDA-PTBI-LPBTD* | | | 0.046* | 1.86 | 0.023 | 0.93 |
| *HiR&D* | | | | | 0.005** | 2.19 |
| *HiCAPX* | | | | | -0.000 | -0.31 |
| *HiCAPX-LNBTD* | | | | | 0.007 | 1.30 |
| *HiR&D-LNBTD* | | | | | 0.025*** | 5.67 |
| *HiCAPX-LPBTD* | | | | | 0.017*** | 3.67 |
| *HiR&D-LPBTD* | | | | | 0.000 | 0.04 |
| *HiCAPX-PTBI* | | | | | -0.025 | -1.65 |
| *HiR&D-PTBI* | | | | | -0.018 | -1.23 |
| *HiR&D-PTBI-LNBTD* | | | | | -0.165*** | -7.28 |
| *HiR&D-PTBI-LPBTD* | | | | | -0011 | -0.40 |
| *HiCAPX-PTBI-LNBTD* | | | | | -0.007 | -0.28 |
| *HiCAPX-PTBI-LPBTD* | | | | | -0.153*** | -5.70 |
| Intercept | 0.031*** | 32.03 | 0.021*** | 19.45 | 0.020*** | 16.28 |
| $R^2$ (%) | 52.16 | | 53.92 | | 54.38 | |
| N | **21,981** | | **21,981** | | **21,981** | |

*, **, *** represent statistical significance level at 10 percent, 5 percent and 1 percent level

In the far-right column, I add the HiR&D and HiCAPX interactions. The primary variables of interest are the (*HiR&D-PTBI-LNBTD)* and (*HiCAPX-PTBI-LPBTD)* interactions respectively. Both of these three-way interactions are significantly negative (coefficients = -0.165 and -0.153 respectively). This indicates that the combination of HiR&D and LNBTD is associated with significantly lower earnings persistence and the combination of HiCAPX and LPBTD is associated with significantly lower earnings persistence. In other words, these are the differentiating combinations between the large BTDs and the middle BTDs. I note that the other three-way interactions (*HiR&D-PTBI-LPBTD)* and (*HiCAPX-PTBI-LNBTD)* are not significantly different from zero – there is no loss of earnings persistence when HiR&D is combined with LPBTD or HiCAPX is combined with LNBTD. I also note that the two-way interactions (*HiR&D-PTBI)* and (*HiCAPX-PTBI)* are not significantly different from zero. This reinforces the observation that it is the combinations of HiR&D with LNBTD and of HiCAPX with LPBTD that matter. Moreover, I observe that the Hanlon coefficients, (*LNBTD-PTBI*) and (*LPBTD-PTBI*) are no longer significantly different from zero when the (*HiR&D-PTBI-LNBTD)* and (*HiCAPX-PTBI-LPBTD)* variables are included. Together, these results provide persuasive evidence that the differential earnings persistence associated with LNBTD and LPBTD can be attributed to the combination of investment in R&D and large negative BTDs and the combination of investment in CAPX and large positive BTDs.

Table 10 presents the results for the models estimated with pre-tax cash flows and accruals. With regard to my main variables of interest, I see that the (*HiR&D-PTACC-LNBTD)* is stronger than the (*HiR&D-PTCF-LNBTD)* coefficients are equal to (-0.191) and (-0.125) respectively, indicating that the lower earnings persistence related to R&D investment is more pronounced with respect to accruals than cash flows. Similarly, I see that the (*HiCAPX-PTACC-LPBTD)* is stronger

than the (*HiCAPX-PTCF-LPBTD)* coefficients=-0.182 and -0.131 respectively), indicating that the lower earnings persistence related to CAPX investment is more pronounced with respect to accruals than cash flows as well.

**Table 10 - Cash Flow and Accruals Persistence with LNBTD and LPBTD Interactions**

| ***Variables*** | ***Hanlon*** | ***t-stat*** | ***HiDA*** | ***t-stat*** | ***HiDA-R&D-CAPX*** | ***t-stat*** |
|---|---|---|---|---|---|---|
| *PTCF* | 0.727*** | 117.71 | 0.795*** | 109.47 | 0.817*** | 93.50 |
| *PTACC* | 0.572*** | 67.67 | 0.695*** | 48.90 | 0.688*** | 43.25 |
| *LNBTD* | 0.014*** | 7.13 | 0.012*** | 4.76 | 0.006** | 2.12 |
| *LPBTD* | 0.007*** | 3.10 | 0.006** | 2.31 | -0.000 | -0.11 |
| *LNBTD-PTCF* | -0.036*** | -3.50 | -0.052*** | -4.29 | -0.014 | -0.95 |
| *LPBTD-PTCF* | -0.074*** | -6.06 | -0.073*** | -4.93 | -0.006 | -0.33 |
| *LNBTD-PTACC* | -0.038*** | -2.68 | -0.133*** | -5.58 | -0.069 | -2.56 |
| *LPBTD-PTACC* | -0.057*** | -3.59 | -0.075*** | -2.78 | -0.029 | -0.91 |
| *HiDA* | | | 0.042*** | 17.02 | 0.042*** | 17.30 |
| *HiDA-LNBTD* | | | -0.007 | -1.48 | -0.012** | -2.51 |
| *HiDA-LPBTD* | | | -0.007 | -1.54 | -0.006 | -1.03 |
| *HiDA-PTCF* | | | -0.215*** | -15.88 | -0.221*** | -16.16 |
| *HiDA-PTACC* | | | -0.326*** | -16.75 | -0.315*** | -15.86 |
| *HiDA-PTCF-LNBTD* | | | 0.039* | 1.78 | 0.071*** | 3.12 |
| *HiDA-PTCF-LPBTD* | | | 0.026 | 1.02 | 0.002 | 0.07 |
| *HiDA-PTACC-LNBTD* | | | 0.215*** | 6.44 | 0.239*** | 7.06 |
| *HiDA-PTACC-LPBTD* | | | 0.091** | 2.47 | 0.070* | 1.87 |
| *HiR&D* | | | | | 0.007*** | 2.71 |
| *HiCAPX* | | | | | 0.000 | 0.29 |
| *HiR&D-LNBTD* | | | | | 0.018*** | 3.70 |
| *HiR&D-LPBTD* | | | | | 0.004 | 0.73 |
| *HiCAPX-LNBTD* | | | | | 0.006 | 1.10 |
| *HiCAPX-LPBTD* | | | | | 0.009* | 1.81 |
| *HiR&D-PTCF* | | | | | -0.042*** | -2.78 |
| *HiR&D-PTACC* | | | | | -0.009 | -0.43 |
| *HiCAPX-PTCF* | | | | | -0.042*** | -2.71 |
| *HiCAPX-PTACC* | | | | | 0.012 | 0.52 |
| *HiR&D-PTCF-LNBTD* | | | | | -0.125*** | -5.41 |
| *HiR&D-PTCF-LPBTD* | | | | | -0.022 | -0.75 |
| *HiCAPX-PTCF-LNBTD* | | | | | -0.002 | -0.08 |
| *HiCAPX-PTCF-LPBTD* | | | | | -0.131*** | -4.80 |
| *HiR&D-PTACC-LNBTD* | | | | | -0.191*** | -5.89 |
| *HiR&D-PTACC-LPBTD* | | | | | 0.068 | 1.65 |
| *HiCAPX-PTACC-LNBTD* | | | | | 0.009 | 0.25 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *HiCAPX-PTACC-LPBTD* | | | | | -0.182*** | -4.80 |
| *Intercept* | 0.024*** | 23.26 | 0.016*** | 13.19 | 0.014*** | 10.02 |
| $R^2$ *(%)* | 53.90 | | 54.78 | | 55.14 | |
| *N* | 21,981 | | 21,981 | | 21,981 | |

*, **, *** represent statistical significance level at 10 percent, 5 percent and 1 percent level

## III.V. Conclusion

I re-examine the question first asked by Hanlon (2005), why large positive and large negative book tax differences (LPBTDs and LNBTDs) are negatively associated with earnings persistence. More specifically, I investigate whether lower earnings persistence in the LPBTD and LNBTD quintiles, relative to the middle BTD quintiles, is due to earnings management (discretionary accruals) or is a consequence of investment (CAPX and R&D) expenditures. My findings do indicate that earnings persistence is intimately related to discretionary accruals. However, I do not find evidence that earnings management itself is responsible for the lower earnings persistence associated with large negative and large positive BTDs. Instead, I find that the combinations of high R&D intensity with large negative BTDs and high CAPX intensity with large positive BTDs explain the lower earnings persistence of large negative and large positive BTDs respectively.

These findings are interesting because they relate lower earnings persistence to investment profiles as opposed to earning management. They indicate that large book tax differences are informative about earnings quality because the tax rules and the accounting rules and practices treat investments and outcomes of investments differently. For R&D investments that are fraught with uncertainty, the accounting rules are apparently more conservative than the tax rules (amortization, provisions and impairments are recognized sooner leading to negative BTDs) whereas, for capital investments, the tax rules are apparently more conservative than the accounting rules (depreciation is recognized sooner for tax purposes). Possibly most interesting is

the observation that high R&D reduces earnings persistence when it is combined with large negative BTDs.

My results help unravel the LNBTD puzzle – why managers would be willing to report lower book income than tax income. As I find a close connection between R&D-intensive firms and the LNBTD quintile, I see that this puzzle can be partially explained by managers' willingness to make investments in innovation that turn BTDs upside down. These managers are not counting on short-term rewards but are betting on future rewards from innovation. This suggests that the information provided by BTDs may include information about future earnings when combined with investment information.

My study provides an explanation for the lower earnings persistence associated with LNBTDs that has been neglected in previous literature. However, this explanation is not complete and more may be done to specifically identify the sources of negative BTDs. Future research may investigate other types of expenditures, such as SG&A expenditures that are associated with lower earnings persistence. Future research may also provide finer information about the specific differences between accounting and tax recognition that result in negative BTDs. With respect to the debate about capitalizing or expensing research and development costs, my study indicates that tax recognition rules are not as favorable in relation to financial reporting recognition rules for R&D-intensive companies versus capital intensive companies.

# CHAPTER FOUR

# IV. What Do Large Negative Book Tax Differences Represent?

**ABSTRACT:** I investigate the characteristics and properties of large negative book tax differences (LNBTDs). Negative BTDs occur when "book" income reported under generally accepted accounting principles is lower than "taxable" income computed based on the application of tax rules. LNBTDs are an interesting irregularity because managers prefer to report higher book income and lower taxable income. I investigate whether LNBTDs occur because of decaying firm performance, are due to earnings management and tax planning, or are outcomes of uncertain strategic engagements - periodic disruptions in performance because losses are recognized for book purposes as part of innovation cycles. I perform a variety of tests to distinguish between these explanations. I find that LNBTD is a transitory state and that LNBTD firms are less likely to be in financial difficulty, have higher growth and future financial performance, generate greater negative accruals, are managed by more able managers, and are characterized by higher levels of R&D and SG&A expenditures than other firms. Taken together, my analysis supports the alternative argument – that LNBTDs occur temporarily as part of innovation cycles.

## IV.I. Introduction

Membership in the large negative book tax difference (LNBTD) subset is an anomaly from a tax planning and earnings management perspective. Recording low financial profits on the one hand and paying high income taxes on the other hand, comes with a considerable cost to managers. I recognize this LNBTD paradox in my thesis, and so I have dedicated this chapter to the study of large negative BTD observations. I address the question whether large negative BTDs are due to decaying firm performance, result from earnings management and tax planning, or are secondary outcomes of strategic decision-making by managers. In contrast to large positive BTDs (LPBTDs), there is no direct incentive for executives to push numbers towards LNBTD consequences. Thus, there should be a potential benefit, outweighing the negative tax and earnings consequences.

Management needs to allocate its time and energy between long-term growth planning and short-term activities, including tax savings and earnings management. If the long-term benefits outweigh the short-term costs, then competent managers will devote more effort toward strategic resource allocation and future earnings (revenue) growth. To achieve optimal performance levels, companies must manage their resources strategically. This is especially true when businesses are operating in uncertain conditions, dealing with complex asset structures, and investing in risky business models. All of this requires capabilities different from that of traditional businesses.

I proceed with the following logic. I first introduce and describe the LNBTD puzzle; I then examine BTDs from contemporary accounting perspectives that may help explain LNBTDs. These perspectives include bankruptcy and financial distress, firm life cycle, downward earnings

management and tax planning. After empirically testing various properties of LNBTDs, I introduce an alternative perspective and test properties associated with this alternative view.

**Overview**

Many studies use effective tax rates and BTDs to represent information about corporate tax planning. LNBTDs appear to be the antithesis of effective tax planning. An interesting question is whether inclusion of firms with large negative BTDs in samples used to evaluate tax planning distorts the information obtained from measures of tax avoidance. I don't address this issue directly but provide information that may be useful for answering this question. Other studies consider LPBTDs to be informative about earnings management but LNBTDs are on the reverse side of income-increasing earnings management. Why would managers, who otherwise prefer to increase book earnings and decrease taxes, tolerate or create situations where LNBTDs occur?

The fundamental question addressed here is: What is the reality underlying LNBTD observations? Are LNBTD observations associated with life cyclicality at the industry level, firm level or even product level? If the answer is yes, then which life cycle and why? Is the LNBTD phenomenon a result of earnings management? Does LNBTD reflect tax strategy? Is it a deliberate practice, or is it a secondary consequence of a corporate strategy at a higher level? Are LNBTDs of a transitory or perpetual nature? Does LNBTD represent a specific form of business? If it does, then which one and what does this mean for investors and the market?

Table 1 provides a crude picture of LNBTD firms compared to their LPBTD counterparts and the whole data sample. Casual comparison of mean values indicates that, compared to LPBTDs, LNBTD firms have higher managerial ability (0.045 vs. 0.011), lower financial distress (O-score of 0.37 vs. 0.44 and Z-score of 7.6 vs. 5.8), spend more on SG&A (0.35 vs.

0.26), twice as much on R&D (0.036 vs. 0.017) and less on capital expenditures (0.056 vs 0.08). Rather than painting a picture of firms on the wrong side of tax planning and earnings management, this indicates that LNBTD firms are an interesting subset that deserves more attention in the tax literature.

**Table 1 – Descriptive Statistics: Whole Sample vs. LBTD Samples**

**Panel A: Whole Sample**

| Variable | No. | Mean | StD | 25% | Median | 75% |
|---|---|---|---|---|---|---|
| Ability | 20,026 | 0.019 | 0.126 | -0.055 | -0.006 | 0.056 |
| Firm efficiency | 20,026 | 0.353 | 0.159 | 0.253 | 0.304 | 0.390 |
| R&D | 20,026 | 0.021 | 0.042 | 0 | 0 | 0.025 |
| CAPX | 20,026 | 0.061 | 0.062 | 0.023 | 0.043 | 0.077 |
| SG&A | 19,294 | 0.292 | 0.233 | 0.132 | 0.239 | 0.393 |
| Other intangibles | 18,382 | 0.044 | 0.089 | 0 | 0.005 | 0.046 |
| PP&E | 20,026 | 0.273 | 0.212 | 0.111 | 0.218 | 0.377 |
| Goodwill | 17,734 | 0.101 | 0.136 | 0 | 0.040 | 0.138 |
| ETR | 20,026 | 0.345 | 0.101 | 0.311 | 0.362 | 0.388 |
| Cash ETR | 20,026 | 0.293 | 0.133 | 0.211 | 0.295 | 0.361 |
| ROA | 20,026 | 0.083 | 0.059 | 0.043 | 0.071 | 0.108 |
| Z-score | 13,076 | 6.340 | 0.289 | 3.189 | 4.711 | 7.410 |
| O-score | 13,058 | 0.415 | 0.289 | 0.147 | 0.391 | 0.662 |

**Panel B: LPBTD Sample**

| Variable | No. | Mean | StD | 25% | Median | 75% |
|---|---|---|---|---|---|---|
| Ability | 3,822 | 0.011 | 0.123 | -0.061 | -0.013 | 0.047 |
| Firm efficiency | 3,822 | 0.338 | 0.149 | 0.247 | 0.294 | 0.372 |
| R&D | 3,822 | 0.017 | 0.037 | 0 | 0 | 0.016 |
| CAPX | 3,822 | 0.082 | 0.085 | 0.028 | 0.053 | 0.106 |
| SG&A | 3,667 | 0.263 | 0.237 | 0.094 | 0.199 | 0.359 |
| Other intangibles | 3,534 | 0.040 | 0.089 | 0 | 0.001 | 0.035 |

| | | | | | | |
|---|---|---|---|---|---|---|
| PP&E | 3,822 | 0.346 | 0.252 | 0.138 | 0.285 | 0.518 |
| Goodwill | 3,450 | 0.104 | 0.147 | 0 | 0.034 | 0.145 |
| ETR | 3,822 | 0.362 | 0.082 | 0.332 | 0.368 | 0.391 |
| ROA | 3,822 | 0.086 | 0.056 | 0.048 | 0.074 | 0.109 |
| Z-score | 2,086 | 5.777 | 4.830 | 2.971 | 4.389 | 6.801 |
| O-score | 2,082 | 0.443 | 0.291 | 0.172 | 0.429 | 0.692 |

**Panel C: LNBTD Sample**

| **Variable** | **No.** | **Mean** | **StD** | **25%** | **Median** | **75%** |
|---|---|---|---|---|---|---|
| Ability | 4,024 | 0.045 | 0.136 | -0.038 | 0.014 | 0.083 |
| Firm efficiency | 4,024 | 0.375 | 0.168 | 0.266 | 0.324 | 0.418 |
| R&D | 4,024 | 0.036 | 0.057 | 0 | 0.006 | 0.055 |
| CAPX | 4,024 | 0.056 | 0.048 | 0.022 | 0.042 | 0.073 |
| SG&A | 3,895 | 0.348 | 0.257 | 0.176 | 0.289 | 0.463 |
| Other intangibles | 3,613 | 0.048 | 0.089 | 0 | 0.006 | 0.058 |
| PP&E | 4,024 | 0.215 | 0.171 | 0.089 | 0.171 | 0.292 |
| Goodwill | 3,476 | 0.084 | 0.118 | 0 | 0.028 | 0.108 |
| ETR | 4,024 | 0.337 | 0.117 | 0.292 | 0.359 | 0.392 |
| ROA | 4,024 | 0.095 | 0.069 | 0.049 | 0.081 | 0.124 |
| Z-score | 2,259 | 7.622 | 6.371 | 3.859 | 5.535 | 8.889 |
| O-score | 2,254 | 0.368 | 0.286 | 0.117 | 0.298 | 0.597 |

## IV.II. Financial Distress and LNBTDs

Wilcox (1973) is one of the first to analyze firm failure probability using archival accounting data. The Santomero and Vinso (1977) study is of particular interest as it appears to be the first investigation to develop probabilistic failure estimates systematically. The methodology is maximum likelihood estimation of the conditional logistic model, while other bankruptcy forecast models base their information content on conventional analysis of financial statements. The Altman (1971) and the White and Turnbull (1975) studies investigate bankruptcy in the

railroad industry as a slice of the broader picture. Altman (1971) examines the efficacy of developing a statistical bankruptcy prediction tool for the American railroad industry. Shumway (1996) investigates the premiums and discounts in stock prices due to risk of company defaults. Later, Shumway (2001) constructs a new version to predict bankruptcy more accurately.

The two most commonly used financial distress models are the Altman Z and the Ohlson O score models (Altman, 1968; Altman, Haldeman and Narayanan 1977; and Ohlson, 1980), which render valuable information regarding likelihood of corporate bankruptcy. New bankruptcy measures are derived from these existing models. These two models and their variants are widely used in academia, industry, and actual practice. Other studies in bankruptcy research include Opler, Tim and Titman (1994), Gilbert, Menon and Schwartz (1990), Jones and Noga (2009) and Gul, Khedmati, Lim and Navissi (2018).

Ayers, LaPlante, and McGuire (2010) used BTD information to test for stock ratings while Crabtree and Maher (2009) test for bond credit ratings. Noga and Schnader (2013) study the impact of BTD tax disclosures on corporate bankruptcy. Their study investigates changes in BTD rather than large negative/positive BTDs and their findings confirm the existence of a relationship between BTDs and financial distress. I contribute to the literature by introducing LNBTD as an information measure to study the probabilities of bankruptcy and distress. If LNBTD is a sign of troubled companies, I anticipate a positive correlation between financial distress indicators, such as Altman's Z-score and Ohlson's O-score, and LNBTD. So, my first set of hypotheses is:

*H1A: LNBTD is negatively associated with the Altman Z score (high probability of bankruptcy).*

*H1B: LNBTD is positively associated with the Ohlson O score (bad financial condition).*

I use Z-score and O-score to create the binary Z and O variables, representing the top quintiles. I examine the frequency of intersections between BTD dummies and the Z and O dummy variables. If my prediction is correct, I expect a high concentration of distressed and illiquid firms in the LNBTD frequency table. I find the opposite, the actual frequency is less (more) than the expected frequency (if uniformly distributed) in the low Z-score (high O-score) quintile, with $Chi^2$ value of 60 (18). If anything, the LPBTD firms appear more likely to be financially distressed than the LNBTD firms.

Panel B gives a better picture of where LNBTDs and LPBTDs stand in terms of financial distress. Here I define new binary variables. The Hi-Z binary value equals one if Altman's Z-score is greater than 7, indicating financial health. Low-Z is equal to 1 if the Altman Z-score is less than 2.5. Prob-F is equal to 1 if Ohlson's failure probability measure is higher than 50%, Prob-O is equal to 1 if Ohlson's failure probability measure is less than 20%. LNBTD firm-year observations are more frequent than expected in the Hi-Z ($Chi^2$ = 77) and Prob-O ($Chi^2$ =31.5) quintile sub samples. LPBTDs, on the other hand, are more frequent than expected in the Low-Z and Prob-F sub samples.

## Table 2 - Frequency Statistics Table

**Panel A: Distress scores LBTD based distribution**

| | LNBTD | SBTD | LPBTD |
|---|---|---|---|
| ***Z*** | 162[(1)] | 1,214 | 330 |
| | 295[(2)] | 1,139 | 272 |
| | 60[(3)] | 5 | 12 |
| | 1.3%[(4)] | 9.3% | 2.5% |
| **O** | 527 | 1,655 | 359 |
| | 439 | 1,697 | 405 |
| | 17.6 | 1 | 5.3 |
| | 4% | 12.7% | 2.8% |

**Panel B: LBTD distribution of High and Low Altman Z-score quintiles**

| | LNBTD | LPBTD |
|---|---|---|
| ***Low-Z*** | 168[(1)] | 352 |
| | 311[(2)] | 287 |
| | 66[(3)] | 14.6 |
| | 1.3%[(4)] | 2.7% |
| ***Hi-Z*** | 834 | 481 |
| | 616 | 569 |
| | 77 | 13.6 |
| | 6.4% | 3.7% |

**Panel C: BTD Distribution of High and Low probability of failure**

| | LNBTD | LPBTD |
|---|---|---|
| ***Prob-F*** | 728 | 911 |
| | 908 | 838 |
| | 35.6 | 6.3 |
| | 6% | 7% |
| ***Prob-O*** | 861 | 577 |
| | 712 | 657 |
| | 31.4 | 10 |
| | 6.6% | 4.4% |

(1) The first number shows the actual number of observations

(2) The second number represents the expected frequency if uniformly distributed

(3) The third number represents the $Chi^2$ of the actual vs. expected frequency difference

(4) The fourth number shows the percentage of observations in the cell

Table 3 uses the three BTD dummies as dependent variables, where both the dependent and independent variables are zero-one binary outcomes, so the regression is a logistic regression. I fail to find any signs of default and bankruptcy for LNBTD. It is only correlated with acquisitions, whereas LPBTD is positively associated with bankruptcy and acquisitions, and negatively associated with liquidation.

**Table 3 - Logistic Relation Between BTDs and Firm's Bankruptcy**
**Logit LP(N)BTD on Bankruptcy and Acquisition**

| Variables | LNBTD | | LPBTD | | SBTD | |
|---|---|---|---|---|---|---|
| | Coef. | Z-stat | Coef. | Z-stat | Coef. | Z-stat |
| Bankruptcy | -0.059 | -0.15 | 0.975*** | 3.20 | -0.679*** | -2.39 |
| Liquidation | -0.033 | -0.09 | -0.371 | -0.86 | 0.222 | 0.73 |
| Acquisition | 0.104** | 2.09 | 0.199*** | 3.92 | -0.188*** | -4.72 |
| Intercept | -1.598*** | -56.61 | -1.729*** | -58.57 | 0.759*** | 33.48 |
| Pseudo $R^2$ | 0.19 | | 0.20 | | 0.20 | |
| No. | 13,076 | | 13,076 | | 13,076 | |

Large BTDs may be indicators of future bankruptcy or liquidation, so I also test for outcomes in periods t+1 and t+2 in Table 4. There is no evidence of LNBTD being a leading indicator of bankruptcy. Interestingly, LPBTD does manifest a significant relation for both t+1 (coefficient = 1.31, Z-stat = 3.06) and t+2 periods (coefficient = 1.54, Z-stat = 2.66). For acquisitions, though, LNBTD is informative for year t (coefficient = 0.149, Z-stat = 2.94) and

marginally significant for year t+1. LPBTD is significantly positive (at 1% level) for all three time periods.

**Table 4 - Basic Logistic Relations**

**Panel A: Probability of current or future bankruptcy based on the LBTD variable**
**Probit Bankruptcy $_{t+n}$ on LNBTD and LPBTD**

| Variables | Bankrupt $_t$ | | Bankrupt $_{t+1}$ | | Bankrupt $_{t+2}$ | |
|---|---|---|---|---|---|---|
| | Coef. | Z-stat | Coef. | Z-stat | Coef. | Z-stat |
| LNBTD | 0.174 | 0.43 | 0.499 | 0.94 | 0.304 | 0.37 |
| LPBTD | 0.949*** | 2.98 | 1.311*** | 3.06 | 1.541*** | 2.66 |
| Intercept | -5.812*** | -29.60 | -6.261*** | -21.67 | -6.660*** | -16.32 |
| Pseudo $R^2$ | 1.20 | | 1.41 | | 3.68 | |
| No. | 13,076 | | 9,312 | | 6,888 | |

**Panel B: Probability of current or future Acquisition based on the LBTD variable**
**Probit Acquisition $_{t+n}$ on LNBTD and LPBTD**

| Variables | Acquisition $_t$ | | Acquisition $_{t+1}$ | | Acquisition $_{t+2}$ | |
|---|---|---|---|---|---|---|
| | Coef. | Z-stat | Coef. | Z-stat | Coef. | Z-stat |
| LNBTD | 0.149*** | 2.94 | 0.124* | 2.01 | 0.122 | 1.64 |
| LPBTD | 0.225*** | 4.35 | 0.259*** | 4.07 | 0.249*** | 3.25 |
| Intercept | -0.879*** | -37.45 | -1.003*** | -35.27 | -1.126*** | -33.26 |
| Pseudo $R^2$ | 0.14 | | 0.10 | | 0.15 | |
| No. | 13,076 | | 9,312 | | 6,888 | |

## Firm Life Cycle and LNBTDs

The question at hand in this section is whether LNBTD is a symptom of declining firms. Is there a pattern here? Can LNBTD be a sign of a phase transition in the overall firm life cycle as argued by Drake (2012)?

Miller and Friesen (1984) classify firm life-cycle stages into five stages: birth, growth, maturity, revival and decline. Similarly, the five life cycle stages identified by Dickinson (2011)

are introduction, growth, maturity, shake-out, and decline. Dickinson proposes a parsimonious life-cycle classification based on cash flow, and predicts differences in firm performance metrics, such as profit margin, earnings persistence, and asset turnover across firm life cycle stages. Agarwal, Sarkar and Echambadi (2002) study how both firm life cycle and product life cycle can impact company survival. Guenther (2011) and Drake (2012) identify firm aspects such as firm age, large special items, firm and business life cycle, and return on assets, to explain the relations between large BTDs and earnings persistence. Drake (2012, p. 2) states:

> "Specifically, in the introduction or growth phases, firms tend to increase operations and acquire assets and investments. Increases in estimates, depreciation, and amortization increase the level of book tax differences, which is not necessarily indicative of tax aggressiveness or earnings management."

If LNBTD observations point to the shakeout and firm decline stages, this should be apparent in their cash flow, earnings, investments, assets and liabilities position, growth, and other aspects of the company's financial ratio analysis. At the shakeout stage, the growth rate of revenue, cash flows, and profit slows down as the industry approaches maturity. Some businesses are naturally eliminated because they cannot grow in pace with the industry or generate negative cash flows. I use liquidity, leverage and performance ratios as informative ratios in the context of my work.

**Table 5 – Descriptive Statistics: Whole sample vs. LBTD samples**

**Panel A: Whole Sample**

| Variable | N | Mean | StD. | 25% | Median | 75% |
|---|---|---|---|---|---|---|
| Strategic costs[(1)] | 19,294 | 0.375 | 0.248 | 0.205 | 0.321 | 0.483 |
| Sales | 20,026 | 1.372 | 0.902 | 0.801 | 1.186 | 1.705 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sales Growth | 14,334 | 0.150 | 0.456 | 0.022 | 0.098 | 0.206 |
| EBIT | 20,026 | 0.128 | 0.103 | 0.064 | 0.104 | 0.165 |
| Earnings Growth | 14,334 | 0.229 | 1.950 | -0.192 | 0.005 | 0.221 |
| R&D Growth | 6,381 | 0.087 | 1.015 | -0.109 | 0.007 | 0.134 |
| Profit Margin | 20,026 | 0.082 | 0.101 | 0.034 | 0.060 | 0.103 |
| Cash Margin | 20,026 | 0.123 | 0.134 | 0.051 | 0.098 | 0.160 |
| Current ratio | 19,488 | 2.920 | 2.956 | 1.491 | 2.176 | 3.289 |
| Quick ratio | 19,426 | 0.735 | 1.515 | 0.099 | 0.320 | 0.804 |
| Solvency ratio | 19,967 | 0.544 | 0.241 | 0.405 | 0.555 | 0.717 |
| R&D to Sales | 12,127 | 0.039 | 0.058 | 0 | 0.014 | 0.055 |
| SG&A to Sales | 19,294 | 0.229 | 0.146 | 0.118 | 0.207 | 0.307 |
| ROA | 20,026 | 0.083 | 0.059 | 0.043 | 0.070 | 0.108 |
| ROE | 19,967 | 0.172 | 1.464 | 0.085 | 0.134 | 0.194 |

**Panel B: LPBTD Sample**

| **Variable** | **N** | **Mean** | **StD.** | **25%** | **Median** | **75%** |
|---|---|---|---|---|---|---|
| Strategic costs | 3,667 | 0.363 | 0.248 | 0.194 | 0.297 | 0.468 |
| Sales | 3,822 | 1.298 | 0.950 | 0.735 | 1.107 | 1.598 |
| Sales Growth | 2,478 | 0.170 | 0.332 | 0.030 | 0.108 | 0.229 |
| EBIT | 3,822 | 0.144 | 0.113 | 0.074 | 0.116 | 0.185 |
| Earnings Growth | 2,478 | 0.496 | 2.931 | -0.145 | 0.052 | 0.359 |
| R&D Growth | 981 | 0.121 | 1.288 | -0.108 | 0.005 | 0.149 |
| Profit Margin | 3,822 | 0.093 | 0.103 | 0.039 | 0.067 | 0.116 |
| Cash Margin | 3,822 | 0.157 | 0.157 | 0.067 | 0.117 | 0.192 |
| Current ratio | 3,708 | 2.653 | 2.739 | 1.362 | 2.006 | 2.980 |
| Quick ratio | 3,703 | 0.665 | 1.431 | 0.089 | 0.290 | 0.742 |
| Solvency ratio | 3,815 | 0.522 | 0.234 | 0.387 | 0.534 | 0.691 |
| R&D to Sales | 2,046 | 0.034 | 0.053 | 0 | 0.012 | 0.046 |
| SG&A to Sales | 3,667 | 0.209 | 0.144 | 0.097 | 0.181 | 0.286 |
| ROA | 3,822 | 0.086 | 0.056 | 0.048 | 0.074 | 0.109 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ROE | 3,815 | 0.174 | 1.837 | 0.097 | 0.142 | 0.206 |

**Panel C: LNBTD Sample**

| Variable | N | Mean | StD. | 25% | Median | 75% |
|---|---|---|---|---|---|---|
| Strategic costs | 3,895 | 0.439 | 0.278 | 0.249 | 0.384 | 0.562 |
| Sales | 4,024 | 1.412 | 0.831 | 0.839 | 1.251 | 1.764 |
| Sales Growth | 2,840 | 0.185 | 0.282 | 0.030 | 0.120 | 0.268 |
| EBIT | 4,024 | 0.134 | 0.123 | 0.068 | 0.111 | 0.176 |
| Earnings Growth | 2,840 | 0.168 | 2.229 | -.027 | -0.018 | 0.208 |
| R&D Growth | 1,506 | 0.070 | 0.532 | -0.137 | 0.001 | 0.142 |
| Profit Margin | 4,024 | 0.089 | 0.149 | 0.036 | 0.065 | 0.115 |
| Cash Margin | 4,024 | 0.123 | 0.161 | 0.053 | 0.102 | 0.169 |
| Current ratio | 3,955 | 3.001 | 2.587 | 1.645 | 2.333 | 3.445 |
| Quick ratio | 3,938 | 0.815 | 1.385 | 0.145 | 0.426 | 0.979 |
| Solvency ratio | 4,006 | 0.571 | 0.288 | 0.439 | 0.598 | 0.746 |
| R&D to Sales | 2,738 | 0.059 | 0.072 | 0.003 | 0.029 | 0.092 |
| SG&A to Sales | 3,895 | 0.271 | 0.171 | 0.155 | 0.247 | 0.357 |
| ROA | 4,024 | 0.095 | 0.069 | 0.049 | 0.081 | 0.124 |
| ROE | 4,006 | 0.211 | 2.457 | 0.088 | 0.141 | 0.211 |

(1) Strategic cost variable is equal to the sum of R&D, SG&A and CAPX

## Table 6- Financial Ratios BTD Analysis

**Panel A: Association between LBTDs and Margin Ratios**

| Variable | LNBTD | | LPBTD | |
|---|---|---|---|---|
| | Coef. | T-stat | Coef. | T-stat |
| Profit Margin | 0.212** | 5.81 | -0.196*** | -5.49 |
| EBIT | 0.137** | 4.39 | 0.117*** | 3.90 |
| Cash Margin | -0.149* | -5.16 | 0.422*** | 14.88 |
| Intercept | 0.184** | 39.00 | 0.14*** | 31.01 |
| $R^2$ (%) | 0.30 | | 1.79 | |
| No. | 20,026 | | 20,026 | |

**Panel B: Association between LBTDs and Leverage Ratios**

| Variable | LNBTD | | LPBTD | |
|---|---|---|---|---|
| | Coef. | T-stat | Coef. | T-stat |
| Asset Turnover | 0.012*** | 3.96 | -0.022*** | -7.01 |
| Solvency Ratio | 0.099*** | 8.40 | -0.085*** | -7.29 |
| Total debt Ratio | 0.000 | 0.16 | -0.000 | -1.00 |
| Equity Ratio | 0.000 | 0.55 | -0.000*** | -6.02 |
| Intercept | 0.129*** | 15.00 | 0.271*** | 31.38 |
| $R^2$ (%) | 0.39 | | 0.60 | |
| No. | 19,967 | | 19,967 | |

**Panel C: Association between LBTDs and Liquidity Ratios**

| Variable | LNBTD | | LPBTD | |
|---|---|---|---|---|
| | Coef. | T-stat | Coef. | T-stat |
| Solvency ratio | 0.094*** | 6.90 | -0.057*** | -4.32 |
| Quick ratio | 0.009*** | 3.31 | 0.005* | 1.75 |
| Current ratio | -0.005*** | -3.45 | -0.005*** | -3.72 |
| Debt to Equity ratio | 0.000 | 0.15 | -0.000 | -0.79 |
| Intercept | 0.16*** | 21.79 | 0.234*** | 33.00 |
| $R^2$ (%) | 0.30 | | 0.32 | |
| No. | 19,330 | | 19,330 | |

**Panel D: Association between LBTDs and Firm Growth Ratios**

| Variable | LNBTD | | LPBTD | |
|---|---|---|---|---|
| | Coef. | T-stat | Coef. | T-stat |
| PTBI | 0.427*** | 10.50 | 0.091** | 2.40 |
| Earnings Growth | -0.005*** | -2.49 | 0.013*** | 6.19 |
| Future E-Growth | 0.013*** | 6.66 | -0.005*** | -2.81 |
| Current Sales | 0.006 | 1.38 | -0.019*** | -4.75 |
| Sales Growth | 0.069*** | 4.69 | 0.025* | 1.79 |
| Future S-Growth | -0.000 | -0.01 | -0.002 | -0.25 |
| Intercept | 0.116*** | 12.81 | 0.177*** | 20.80 |
| $R^2$ (%) | 1.72 | | 0.83 | |
| No. | 10,668 | | 10,668 | |

**Table 7- Association Between LBTDs and Innovation Variables**

**Panel A: R&D/Sales, SG&A/Sales and Other Intangibles as measures for innovation**

| Variables | LNBTD | T-stat | SBTD | T-stat | LPBTD | T-stat |
|---|---|---|---|---|---|---|
| R&D to Sales | 0.813*** | 9.38 | -0.585*** | -5.69 | -0.229*** | -2.88 |
| SG&A to Sales | 0.251*** | 7.40 | -0.213*** | -5.30 | -0.038 | -1.23 |
| Other Intangibles(1) | -0.025 | -0.51 | -0.000 | -0.01 | 0.026 | 0.60 |
| Intercept | 0.128*** | 15.40 | 0.687*** | 69.80 | 0.185*** | 24.40 |
| $R^2$ (%) | 3.12 | | 1.31 | | 0.23 | |
| No. | 10,661 | | 10,661 | | 10,661 | |

**Panel B: Strategic cost and Intangible Assets other than Goodwill as innovation proxie**

| Variables | LNBTD | T-stat | SBTD | T-stat | LPBTD | T-stat |
|---|---|---|---|---|---|---|
| Strategic cost | 0.204*** | 17.00 | -0.173*** | -11.64 | -0.031*** | -2.59 |
| Other Intangibl | 0.157*** | 4.69 | -0.056 | -1.38 | -0.101*** | -3.04 |
| Interce | 0.114*** | 20.01 | 0.679*** | 96.69 | 0.207*** | 36.60 |
| $R^2$ (% | 1.58 | | 0.70 | | 0.11 | |
| N | 17,722 | | 17,722 | | 17,722 | |

(1)Other Intangibles is Total Intangible Assets other than Goodwill

(2) Strategic cost variable is equal to the sum of R&D, SG&A and CAPX

A casual descriptive comparison between LNBTDs and LPBTDs in Table 5 indicates that the LNBTD subset on average has higher ROA, ROE, SG&A ratio, R&D ratio, current and quick ratios, better sales and sales growth, but lower profit and cash margins, lower EBIT and earnings growth. Table 6 provides additional descriptive information in simple regressions relating LNBTD and LPBTD to various dimensions (margins, leverage, liquidity, growth). Interestingly, the profit margin coefficient is positive for the LNBTD regression and negative for the LPBTD regression in Panel A of Table 6. But the cash flow margin coefficient is negative for the LNBTD regression and positive for the LPBTD regression. This suggests that LNBTD companies have higher earnings but less cash realization in the current year. There is some evidence of higher liquidity for LNBTD firms in Panel C of table 6. In Panel D of Table 6, LNBTD is more strongly associated with future earnings growth while LPBTD is more strongly associated with current earnings growth. LNBTD is also positively correlated with current sales growth. Overall, this descriptive information suggests that many LNBTD firm-year observations are in growth stages as opposed to shake-out or decline stages.

In Panel A of Table 7, I relate the BTD indicator variables to commonly used innovation indicators, including R&D and SG&A to Sales (Jensen and Webster 2009), as innovation indicators. In Panel B, I construct a new variable that I call Total Strategic Expenditure equal to the sum of Capital expenditures, R&D spending plus SG&A costs divided by total assets. In both cases, the evidence suggests that LNBTD firms are innovation-oriented firms.

In Table 8, I provide a more comprehensive regression analysis relating the BTD indicator variables to the various ratios. Dickinson (2011) characterizes shake-out firms by their reduction in investments, earnings and dividend decline, disposal of capital generating assets, and asset write-downs in general. Dickinson hypothesizes that the mature stage is most strongly associated

with earnings persistence, and then relative to the mature phase, she finds stages before and after maturity with declining signs in future profitability. The Drake (2012) life cycle analysis does not neglect large negative BTDs, she attributes LNBTD to firm decline, liquidation, goodwill write-offs, asset write-downs, insolvency, low levels of innovation, low levels of investment and growth. My analysis of financial ratios characterizes LNBTD firms differently, as growing innovation-oriented firms.

**Table 8- BTD Regression on Financial Ratios**

| Variables | LNBTD | T-stat | SBTD | T-stat | LPBTD | T-stat |
|---|---|---|---|---|---|---|
| R&D to Sales | 1.391*** | 42.00 | -0.802*** | -19.70 | -0.589*** | -18.28 |
| Adv. to Sales | 0.349*** | 7.59 | -0.305*** | -5.39 | -0.045 | -1.02 |
| Quick Ratio | 0.019*** | 9.40 | -0.034*** | -14.03 | 0.015*** | 8.04 |
| Current Ratio | -0.014*** | -8.70 | 0.036*** | 18.06 | -0.022*** | -13.81 |
| Price to Sales | 0.008*** | 12.00 | -0.005*** | -6.51 | -0.002*** | -4.10 |
| Price to Cash flow | 0.000 | 1.34 | 0.000 | 0.48 | -0.000** | -1.98 |
| Dividend Ratio | -0.003** | -2.43 | 0.008*** | 5.06 | -0.005*** | -3.89 |
| Profit Margin | -0.257*** | -5.27 | 1.339*** | 22.35 | -1.083*** | -22.79 |
| Operating Margin | -0.482*** | -19.47 | 0.288*** | 9.49 | 0.193*** | 8.02 |
| Cash Margin | 0.259*** | 5.50 | -1.469*** | -25.36 | 1.209*** | 26.35 |
| ROA | 0.542*** | 30.04 | -0.489*** | -22.21 | -0.049*** | -2.82 |
| ROE | 0.001 | 0.97 | -0.024*** | -3.73 | 0.024*** | 4.67 |
| PEG Ratio | 0.000*** | 2.66 | 0.001*** | 4.14 | -0.001*** | -7.96 |
| Book Market Ratio | -0.016*** | -3.53 | -0.005 | -0.91 | 0.021*** | 4.77 |
| | 0.111*** | 21.29 | 0.748*** | 22.05 | 0.139** | 27.37 |
| $R^2$ (%) | 4.40 | | 3.59 | | 3.69 | |
| No. | 88,935 | | 88,935 | | 88,935 | |

*, **, *** Represent statistical significance at 10 percent, 5 percent and 1 percent levels.
(1) The letter M represents three managerial ability variables, MA dummy (highly ranked firms), MA-score and Ability score (Demerjian et al. 2012)

**Earnings Management and LNBTDs**

When companies experience negative or low earnings in a given year, management may see this as an opportunity to dump other expenses into the same financial reporting period, so it takes deliberate action to write down assets and recognize goodwill impairments. “Big bath” earnings management can result in large negative BTDs because the goodwill write-offs and asset write-downs do not impact taxable income but significantly reduce the financial reporting income statement numbers.

Sikora (1999) considers big bath accounting as a subset of the broader earnings management behavior, representing significant non-recurring losses or expenses taken in the current period to smooth and improve future earnings performance. Because the company has already taken a big loss, the management hopes it will be punished only once for severely depressed earnings. This practice of "taking a big bath" or "clearing of the decks" makes it easier to generate higher profits later (Jordan and Clark 2004). Previous research finds compelling evidence supporting big bath to be a practiced earnings management method and not just a theory. Xie (1998) finds current discretionary accruals are negatively related to future earnings changes; i.e., highly negative discretionary accruals imply future earnings increases. Based on this theory, I search for evidence of big bath accounting using the most negative discretionary accruals (DA) observations in my sample. Based on the big bath accounting theory, I expect a concentration of highly negative DA observations in the LNBTD subset signifying income dumping or earnings smoothing action. I rank discretionary accruals values using the Jones model (Jones 1991). Then I define a binary variable (Neg DA) equal to one for the bottom 3,500 negative ranked firm-year observations.

*H2: LNBTD is positively associated with highly negative discretionary accruals.*

In the frequency Table 9, Panel A, Neg. DA is disproportionately high in the LNBTD sub-sample (913 obs. vs. 660 if uniformly distributed, $Chi^2$ =97). In Panel B, Neg. DA firm year observations are also more frequent in the high managerial ability (High MA) sub sample (815 obs. vs. 660, $Chi^2$ =36) and in the high SG&A sub sample of interest, negative DA observations are also more frequent in the LPBTD sub sample. From Table 9, Panel C, BTD (continuous variable) does not correlate as strongly with Hi-DA (top quintile based on absolute values of discretionary accruals) but it does negatively correlate with Neg. DA. LNBTD, however, is positively correlated with both Hi-DA (coefficient = 0.052, t-stat = 6.80) and Neg. DA (coefficient = 0.10, t-stat = 13.25).

**Table 9- Frequency Statistics Table**

**Panel A: Top Negative Discretionary Accruals BTD based distribution**

| ***Sub Sample*** | ***LNBTD*** | ***SBTD*** | ***LPBTD*** |
|---|---|---|---|
| ***Neg DA*** | 913(1) | 1,605 | 765 |
| | 660(2) | 1,997 | 626 |
| | 97(3) | 77 | 30.5 |
| | 4.5%(4) | 8% | 3.8% |

**Panel B: High negative Discretionary Accruals distribution within MA, HI R&D and Hi SG&A quintiles**

| ***Sub Sample*** | ***MA*** | ***Hi R&D*** | ***Hi SG&A*** |
|---|---|---|---|
| ***Neg DA*** | 815 | 540 | 775 |
| | 660 | 637 | 660 |
| | 36 | 15 | 20 |
| | 4% | 2.7% | 3.9% |

**Panel C: BTD Regression on Top and Bottom Discretionary Accruals**

| Variable | BTD | | LNBTD | |
|---|---|---|---|---|
| | Coef. | T-stat | Coef. | T-stat |
| Neg DA | -0.003*** | -3.89 | 0.103*** | 13.25 |
| Hi DA | -0.001 | -1.68 | 0.052*** | 6.80 |
| constant | 0.006*** | 18.27 | 0.175*** | 50.60 |
| $R^2$ (%) | 0.80 | | 0.88 | |
| No. | 20,076 | | 20,026 | |

(1) The first number shows the actual number of observations
(2) The second number represents the expected frequency if uniformly distributed
(3) The third number represents the $Chi^2$ value of the actual vs. expected frequency difference
(4) The fourth number shows the percentage of observations in the cell
*, **, *** Represent statistical significance level at 10, 5 and 1 percent levels.

This evidence does favor earnings management but may also reflect conservative accounting. In a similar fashion to big bath accounting, asymmetrical gain and loss recognition can significantly reduce the income numbers in financial statements while tax income numbers remain untouched. Relating earnings to stock returns in a piece-wise manner, Basu (1997) finds losses are recognized in a more timely fashion than gains. Ball and Shivakumar (2005) find nonlinear models are less biased. Guay (2006) provides a follow up discussion of Ball and Shivakumar's 2005 article. Thus, large negative discretionary accruals can be due to big bath accounting (Xie, 1998) or timely loss recognition (Basu, 1997; Ball and Shivakumar 2006). Timely loss recognition may be especially salient for innovation firms (Anderson, Banker, Frost and Tripathi, 2021).

**Tax Avoidance and LNBTDs**

Book tax gaps and effective tax rates (ETR) are widely used measures of tax avoidance in tax accounting research (Guenther 2014). In Table 10, Panel A, I use cash effective tax rates

(cash ETRs) to form a quintile of firms that are typically classified as high tax avoidance firms (HiTA). On the side of firms pursuing book incomes, Erickson, et al. (2004) found managers engaged in fraudulent financial reporting paid an additional eight cents in taxes to report each additional dollar of fraudulent earnings, confirming a trade-off between reported income and taxable savings. Lennox et al. (2013) document that tax aggressive U.S. public firms are less likely to commit accounting fraud.

Not surprisingly, LNBTD firms are underrepresented in the HiTA sample. LPBTD firms, on the other hand, are vastly overrepresented. This suggests that understanding the nature of the firms in the LNBTD and LPBTD quintiles is important to the tax avoidance literature.

**Table 10 –Relation between LBTDs and Effective tax avoidance**

**Panel A: BTD based distribution of high tax avoidance quintile**

| Sub Sample | LNBTD | SBTD | LPBTD |
|---|---|---|---|
| *Hi TA*[(1)] | 462[(1)] | 1,884 | 1,301 |
| | 732[(2)] | 2,218 | 696 |
| | 100[(3)] | 50 | 525 |
| | 2.3%[(4)] | 9.4% | 6.5% |
| **Sub Sample** | **Hi IO[(2)]** | **Hi SG&A** | **MA** |
| *Hi TA* | 302 | 501 | 853 |
| | 369 | 733 | 733 |
| | 12 | 73.5 | 19 |
| | 1.5% | 2.5% | 4.2% |

[(1)] The first number shows the actual number of observations
[(2)] The second number represents the expected frequency if uniformly distributed
[(3)] The third number represents the $Chi^2$ value of the actual vs. expected frequency difference
[(4)] The fourth number shows the percentage of observations in the cell. The expected frequency percentage for each cell is 4%.

**Panel B: Rank based BTD-TA OLS Regression**

| *Sub Sample* | *Coefficient* | *T-stat* | *$R^2$ (%)* | *No.* |
|---|---|---|---|---|
| ***Rank_BTD on Rank_TA*** | -0.311*** | -43.71 | 0.09 | 20,026 |

[(1)] Hi-TA is a binary variable equal to 1 for the bottom 20% observations in the Cash-ETR ranking distribution
[(2)] Hi INT is a dummy variable with binary values equal to 1 for the top 20% observations in the Intangible Assets Other than Goodwill ranking distribution.
*, **, *** Represent statistical significance at 10 percent, 5 percent and 1 percent levels.

In Panel A, I also relate HiTA to other classifications of firms, including Hi-IO (firms with high intangible assets other than goodwill), HiSG&A, and Hi-MA (managerial ability). Interestingly, the HiTA firms are underrepresented in the Hi-IO and HiSG&A quintiles, but somewhat over-represented in the Hi-MA quintile, suggesting that high managerial ability managers do manage taxes aggressively (see Koester, Shevlin and Wangeren, 2017). There is a possibility that negative BTD occurs if previously aggressive tax avoidance strategies reverse but the tax avoidance literature finds that low ETRs are relatively persistent (Dyreng, Hanlon and Maydew, 2008).

In Panel B of Table 10, I run a regression on the rank variables of the tax avoidance measures, Rank_TA on Rank_BTD. The coefficient value of -0.31(t-stat of -43.70) indicates how strong the BTD-ETR association is. From a tax perspective, it seems counter-intuitive that a group of firms are, in a sense, being taxed highly when their book income is low. A plausible reason is that these firms have low income temporarily but are anticipating future growth in earnings.

So far, I have demonstrated that membership in the LNBTD subset is not a consequence of default and bankruptcy, does not have characteristics associated with shake-out or decline, does have high negative accruals, and does not emerge from tax avoidance. So, the question remains: What is the condition or consequence that creates the large negative BTD phenomenon?

**Transitory Nature of LNBTDs**

In this section, I consider the question whether LNBTDs occur temporarily or are persistent. As noted earlier, managers have incentives to increase reported income and decrease taxable income, so I anticipate that LNBTDs are a temporary state. I construct a frequency table (Table

11) and a pairwise correlation matrix (Table 12) between current LN(P)BTD binary value, one year from now (LN(P)$BTD_{t+1}$) and two years from now (LN(P)$BTD_{t+2}$) binary values. Because LNBTD represents a quintile of firm-year observations, the expected frequency of LNBTD recurring in t+1 is 597, on average, if BTDs are randomly redistributed each year. The actual frequency of recurrence is 1,125, on average, indicating that LNBTDs have about a 20 per cent higher likelihood of recurring than would be expected by chance. In other words, about 60 per cent of LNBTD observations in t are not in the LNBTD subset in t+1. I get similar information from the correlation matrix in Table 12. There is a 0.221 positive correlation between being in the LNBTD subset in period t and again in period t+1. Thus, I conclude that LNBTDs are more transient and temporary than sticky and ongoing.

**Table 11 - Frequency Statistics Table**

***Panel A: LBTD $_{t+n}$ Observation Frequency and Persistence***

| ***Sub Sample*** | ***LPBTD$_{(t+1)}$*** | ***LPBTD$_{(t+2)}$*** | ***LNBTD$_{(t+1)}$*** | ***LNBTD$_{(t+2)}$*** |
|---|---|---|---|---|
| ***LNBTD*** | 331(1) | 288 | 1,125 | 732 |
| | 527(2) | 379 | 597 | 433 |
| | 73(3) | 22 | 467 | 207 |
| | 2%(4) | 2.5% | 7.5% | 6.5% |

***Panel B: High Managerial Ability BTD based distribution***

| ***Sub Sample*** | **LPBTD$_{(t+1)}$** | **LPBTD$_{(t+2)}$** | **LNBTD$_{(t+1)}$** | **LNBTD$_{(t+2)}$** |
|---|---|---|---|---|
| ***LPBTD*** | 1,151 | 696 | 359 | 307 |
| | 486 | 343 | 551 | 392 |
| | 910 | 37 | 67 | 18 |
| | 8% | 6.2% | 2.4% | 2.7% |

(1) The first number shows the actual number of observations

(2) The second number represents the expected frequency if uniformly distributed

(3) The third number represents the $Chi^2$ value of the actual vs. expected frequency difference

(4) The fourth number shows the percentage of observations in the cell

**Table 12 - Pairwise Correlations**

**(Pearson above and Spearman below the Diagonal)**

| Variable | $LNBTD_{(t-1)}$ | LNBTD | $LNBTD_{(t+1)}$ | $LPBTD_{(t-1)}$ | LPBTD | $LPBTD_{(t+1)}$ | MA | $MA_{(t+1)}$ |
|---|---|---|---|---|---|---|---|---|
| **$LNBTD_{(t-1)}$** | 0 | | | | | | | |
| **LNBTD** | **0.220**$^{***}$ | 0 | | | | | | |
| **$LNBTD_{(t+1)}$** | **0.166**$^{***}$ | **0.221**$^{***}$ | 0 | | | | | |
| **$LPBTD_{(t-1)}$** | **-0.237**$^{***}$ | -0.086$^{***}$ | -0.049$^{***}$ | 0 | | | | |
| **LPBTD** | -0.087$^{***}$ | -0.239$^{***}$ | -0.082$^{***}$ | 0.299$^{***}$ | 0 | | | |
| **$LPBTD_{(t+1)}$** | -0.052$^{***}$ | -0.086$^{***}$ | -0.229$^{***}$ | 0.214$^{***}$ | 0.301$^{***}$ | 0 | | |
| **MA** | 0.072$^{***}$ | **0.082**$^{***}$ | 0.064$^{***}$ | -0.014 | -0.018 | -0.009 | 0 | |
| **$MA_{(t+1)}$** | 0.076$^{***}$ | 0.059$^{***}$ | 0.046$^{***}$ | -0.029$^{***}$ | -0.014 | -0.009 | 0.65 | 0 |

All variable definitions can be found in Appendix A. Numbers with $^{*}$ represent statistical significance at the 10 percent level, numbers with $^{**}$ represent statistical significance at the 5 percent level, and numbers with $^{***}$ represent statistical significance at the 1 percent level. Correlations of particular importance are shown in bold font.

## IV.III. Alternative Hypothesis

My alternative hypothesis is that LNBTD observations do not constitute firms in financial distress and decline, but, quite the opposite, represent a cluster of well-managed firms that include innovative, high tech and R&D intensive companies. In the subsequent sections, I provide information that links LNBTD firms to managerial ability, innovation, high technology, intangible asset complexity and R&D intensity. Naturally, high tech and growth businesses attract competent managers who invest in strategic assets and resources to increase firm performance and efficiency. Thus, the managers' focus, energy, and attention will be on growth in firm value, and investment in R&D and other strategic resources. Consequently, tax avoidance and earnings management become secondary in relation to long-term plans associated with new product development and risky growth and investment strategies.

**Managerial Ability and LNBTDs**

If LNBTD firms use highly advanced technology, invest primarily in intangible resources, and have sophisticated business models, they need talented managers. Finding the right combinations of R&D, goodwill, SG&A, and PP&E requires high levels of resource allocation efficiency and effectiveness from the executive side. In the paper "Quantifying Managerial Ability: A New Measure and Validity Tests", Demerjian, Lev and McVay (2012, p. 1) state:

> "We expect more able managers to better understand technology and industry trends, reliably predict product demand, invest in higher value projects, and manage their employees more efficiently than less able managers. In short, we expect more able managers to generate higher revenue for a given level of resources or, conversely, to minimize the resources used for a given level of revenue (i.e., to maximize the efficiency of the resources used)."

Demerjian, Lev and McVay (2013) find that replacing CEO's with more able CEO's is associated with improvements in future firm performance. Moreover, managerial ability mitigates the negative relation between equity financing and future abnormal returns documented in prior research. They emphasize controlling for firm-specific effects, improving the explanatory power and improving the measure. The Demerjian et al. (2012) first stage data envelopment analysis (DEA) is based on a simple input-output function. Assume every firm receives a set of resources similar to a set of cards dealt and distributed through the whole deck. These resources include financial assets, human capital, labour, energy, etc. These resources are converted into inputs through an allocation and management process based on managerial skills. Inputs include quantifiable accounting proxies:

- Selling, general & administrative expenses (SG&A).
- Cost of goods sold (COGS).
- Net property, plant and equipment (PP&E).
- Net operating leases (NOL).
- Net research & development.
- Purchased goodwill.
- Other intangible assets.

The rationality behind this model is that high-quality managers will increase the efficiency of the output in relation to the inputs. In other words, they will generate higher revenue, conditional on a certain set of inputs.

In the second stage of their analysis, Demerjian et al. (2012) regress the efficiency scores obtained in the first stage on various characteristics of firms that may influence efficiency in order to obtain the residual Managerial Ability (MA) score. This score and other estimations and calculations, such as firm efficiency and firm performance measures, are publicly available on the Demerjian website. Within the Demerjian database, there are two MA items. The first one, Ability, is a continuous variable and the other is a cardinal-based 0 to 1 MA-score. Based on the Ability score, I construct the ordinal rank-MA, ranked from 0 to 20,026, and then the high MA dummy variable as the top quintile of the ranking distribution.

If LNBTD is an indication of higher firm efficiency and higher managerial ability, then I expect a statistically significant positive association.

*H3A: There is a significantly positive association between firm efficiency and LNBTDs.*

*H3B: There is a significantly positive association between managerial ability and LNBTDs.*

In Table 13, I relate the High Efficiency quintile (based on the ranked values of the first-stage efficiency measures) to the large BTD quintiles in Panel A and to quintiles based on R&D,

SG&A, and CAPX in Panel B. LNBTD is disproportionately represented in the High Efficiency firms. An interesting statistical fact is the high $Chi^2 = 334$ in the high efficiency-high R&D cell where there are 1,043 firm-year observations compared to the expected 596 observations, indicating the importance of R&D for high efficiency firms.

**Table 13 - Frequency Statistics Firm Efficiency**

**Panel A: High Firm Efficiency[5] distribution in BTD and MA sub samples**

| *Sub Sample* | *LNBTD* | *Hi MA* | *LPBTD* |
|---|---|---|---|
| *Hi EF* | 745[1] | 2,250 | 502 |
| | 617[2] | 617 | 586 |
| | 26[3] | 4317 | 12 |
| | 3.7%[4] | 11% | 2.5% |

**Panel B: High Firm Efficiency[5] distribution in Asset type sub samples**

| *Sub Sample* | Hi R&D | Hi SG&A | Hi CAPX |
|---|---|---|---|
| *Hi EF* | 1,043 | 745 | 633 |
| | 596 | 617 | 600 |
| | 334 | 26.5 | 1.8 |
| | 5.2% | 3.7% | 3.16% |

[1] The first number shows the actual number of observations

[2] The second number represents the expected frequency if uniformly distributed

[3] The third number represents the $Chi^2$ value of the actual vs. expected frequency difference

[4] The fourth number shows the percentage of observations in the cell

[5] A dummy variable, which is equal to one for firm-year observations with FE in the highest quintile of firms in each year, and zero otherwise. Refer to Appendix A, Table 1.

In Table 14, I provide a similar analysis for High MA (top quintile based on managerial ability scores). Again, I see a disproportionately high number of highly competent managers in the LNBTD sub sample and not in the other BTD sub samples. Panel B of Table 14 provides the High MA population distribution for the three resource inputs (HiR&D, HiCAPX, HiSG&A). The HiMA-HiR&D cell has 1,498 observations compared to the expected frequency of 782 ($Chi^2 = 656$). Table 15 presents the associations in a regression format. Panel A shows the positive

relations between Firm Efficiency and the LNBTD indicator variable as well as between Firm Efficiency and the investment variables. Panel B also shows the strong positive association between managerial ability and LNBTD.

**Table 14 - Frequency Statistics Managerial Ability**

**Panel A: High Managerial Ability BTD based distribution**

| *Sub Sample* | *LNBTD* | *SBTD* | *LPBTD* |
|---|---|---|---|
| *Hi MA* | 1,074[(1)] | 2,238 | 746 |
| | 809[(2)] | 2,448 | 804 |
| | 86.8[(3)] | 18 | 4 |
| | 5.4%[(4)] | 11% | 4% |

**Panel B: Managerial Ability Asset type Samples**

| *Sub Sample* | *Hi R&D* | *Hi SG&A* | *Hi CAPX* |
|---|---|---|---|
| *Hi MA* | 1,498 | 1,220 | 896 |
| | 782 | 809 | 787 |
| | 656 | 31 | 15 |
| | 7.5% | 6% | 4.5% |

**Panel C: Low Managerial Ability - BTD based distribution**

| *Sub Sample* | *LNBTD* | *SBTD* | *LPBTD* |
|---|---|---|---|
| *Low MA* | 556 | 2,571 | 872 |
| | 804 | 2,432 | 763 |
| | 76 | 8 | 15 |
| | 2.8% | 13% | 4.4% |

**Panel D: Low Managerial Ability Asset type Samples**

| *Sub Sample* | *Hi R&D* | *Hi SG&A* | *Hi CAPX* |
|---|---|---|---|
| *Low MA* | 266 | 410 | 896 |
| | 776 | 804 | 786 |
| | 335 | 193 | 15 |
| | 1.5% | 2% | 4.5% |

[(1)] The first number shows the actual number of observations
[(2)] The second number represents the expected frequency if uniformly distributed
[(3)] The third number represents the Chi2 value of the actual vs. expected frequency difference
[(4)]The fourth number shows the percentage of observations in the cell

## Table 15 - OLS Models

**Panel A: Relation between Firm Efficiency, LBTDs and Strategic Expenditure**

| Variables | Firm Efficiency | T-stat | Efficiency Rank | T-stat |
|---|---|---|---|---|
| LPBTD | -0.012*** | -3.83 | -0.016*** | -3.84 |
| LNBTD | 0.009*** | 3.06 | 0.018*** | 4.42 |
| CAPX | 0.08*** | 4.43 | 0.226*** | 8.51 |
| R&D | 0.777*** | 28.61 | 1.232*** | 30.97 |
| SG&A | 0.058*** | 12.06 | 0.076*** | 10.75 |
| Intercept | 0.314*** | 139.23 | 0.627*** | 190.00 |
| $R^2$ (%) | 5.9 | | 6.6 | |
| No. | 19,294 | | 19,294 | |

**Panel B: Relation between the three Managerial Ability measures and LBTDs**

| Variable | MA | | Ability | | MA-score | |
|---|---|---|---|---|---|---|
| | Coef. | T-stat | Coef. | T-stat | Coef. | T-stat |
| LNBTD | 0.083*** | 11.45 | 0.032*** | 14.13 | 0.06*** | 12.04 |
| LPBTD | 0.003 | 0.41 | -0.001 | -0.60 | -0.001 | -0.22 |
| BTD | -0.376*** | -5.31 | -0.172*** | -7.72 | -0.29*** | -5.96 |
| constant | 0.184*** | 50.77 | 0.013*** | 11.47 | 0.593*** | 239.02 |
| $R^2$ (%) | 0.7 | | 1.1 | | 0.77 | |
| No. | 20,026 | | 20,026 | | 20,026 | |

*, **, *** Represent statistical significance level at 10 percent, 5 percent and 1 percent level.

### Strategic Assets and Resources

To further develop the theoretical foundation for the alternative hypothesis, I rely on the resource-based strategy literature represented by Barney (1991) and Amit and Shoemaker (1993). Amit and Shoemaker (1993) connect market level strategy with firm-level strategies. The market level conditions are the strategic industry and business level factors, whereas the firm-level strategy is defined by the strategic asset allocation discretion and strategic decision making of management. Tangible or intangible resources, with specific characteristics, can generate and

sustain economic rents (Amit and Schoemaker, 1993). Barney coined the term "strategic assets" for these resources. Barney states they are valuable, rare, imperfectly imitable, and impossibly hard to substitute (Barney, 1991). The Resource-Based View (RBV) theory has established the importance of strategic assets as determinants of sustainable competitive advantage and financial firm performance (Michalisin, Smith and Kline 1997: Wemerfelt, 1984; Mahoney and Pandian, 1992). The control and ownership of strategic assets is a necessary condition for sustained competitive advantage. Control and ownership skills are, in turn, part of management capabilities. Furthermore, firms require financial management capability to realize the rents present in these strategic assets.

Strategic assets become apparent when performing a detailed review of the LNBTD firm and industry characteristics. Highly advanced tech-based enterprises have more uncertainty-oriented resources and more complex assets. A company creates knowledge (organizational capital) by spending on R&D (SG&A), but U.S. accounting rules record R&D (SG&A) as expenses. If the R&D (SG&A) is purchased, U.S. accounting rules allow the firm to capitalize the expenditures as intangible assets. The logic behind Peters and Taylor's (2017) Q model provides for the treatment of R&D and SG&A as investments instead of operating costs. Compared to regular operating costs, R&D expenditure is more complicated due to its dual capital cost versus capital asset nature and the uncertainty and variability of future earnings from R&D investments. SG&A costs are part of strategic investments because they include salaries for various IT, accounting, marketing and promotion, product and services departments. Intellectual property rights protection, consulting services fees, new product innovation etc., are all included in the SG&A item of the income statement. In addition, costs associated with patents and

trademarks are part of SG&A, and so are brand promotion, brand advertising commissions fees. In general, most intangible asset costs are included in this subcategory.

Employee capabilities and know-how, company reputation, product branding, and organizational culture possess the characteristics of strategic investments and resources (Michalisin et al., 1997). I use the R&D ratio (R&D to Sales) and the SG&A ratio (SG&A/Sales) to proxy for strategic asset allocation. If R&D and SG&A represent strategic resources, I expect the two innovation proxies, R&D to Sales and SG&A to Sales, to show this in the LN(P)BTD and MA tests.

*H4A: There is a significantly positive (negative) association between LN(P)BTDs and R&D investments.*

*H4B: There is a significantly positive (negative) association between LN(P)BTDs and SG&A expenditure.*

Results in Table 16 confirm that LNBTD is positively associated with both R&D to sales and SG&A to sales whereas LPBTD is negatively associated with both variables. LNBTD is informative in the sense that it represents high tech, innovative businesses with complex product life cycles (PLCs). A firm's R&D investment and SG&A expenditure are focused on product and process innovation. Innovation is a critical factor in achieving and sustaining an advantage over competition (Khazanchi, Lewis, and Boyer, 2007). Subsequently, innovation management is perceived as a crucial responsibility for top management (Christensen, 1999). High performing managers need management accounting skills to understand, allocate, and effectively use company resources, including strategic resources (Cooper and Kaplan, 1992).

**Table 16 - OLS Regression**

**Regressing LBTD and MA binary variables on (R&D, SG&A) to Sales Ratio**

| Variable | LNBTD | | LPBTD | | MA | |
|---|---|---|---|---|---|---|
| | Coef. | T-stat | Coef. | T-stat | Coef. | T-stat |
| SG&A to Sales | 0.258*** | 8.21 | -0.044 | -1.50 | 0.689*** | 22.79 |
| R&D to Sales | 0.891*** | 0.83 | -0.198*** | -2.70 | 1.549*** | 20.01 |
| $R^2$ (%) | 3.5 | | 10.1 | | 15.7 | |
| No. | 11,774 | | 11,774 | | 11,774 | |

*, **, *** Represent statistical significance level at 10 percent, 5 percent and 1 percent level.

**Table 17- OLS, Logit and Probit Regression**

**OLS, Probit, Logit regression: XBTD on Hi-IO Hi R&D Hi CAPX, HiSG&A**

| *Variables* | Hi-IO(1) | Hi R&D | Hi CAPX | Hi Goodwill | Hi SG&A | Intercept | $R^2$ (%) | No. |
|---|---|---|---|---|---|---|---|---|
| *BTD (OLS)* | -0.004*** (-4.53) | -0.009*** (-13.20) | 0.012*** (16.51) | 0.004*** (4.07) | -0.005*** (-7.71) | 0.006*** (15) | 2.9 | 20,026 |
| *LNBTD (OLS)* | 0.03*** (3.22) | 0.140*** (19.69) | -0.036*** (-5.02) | -0.048*** (-5.08) | 0.079*** (11.40) | 0.166*** (40.80) | 3.1 | 20,026 |
| *LNBTD (Logit)* | 0.175*** (3.11) | 0.776*** (18.97) | -0.239*** (-5.01) | -0.355*** (-5.22) | 0.473*** (11.30) | -1.610*** (-59) | 2.9 | 20,026 |
| *LNBTD (Probit)* | 0.101*** (3.03) | 0.455*** (18.80) | -0.140*** (-5.21) | -0.195*** (-5.27) | 0.275*** (11.24) | -0.967*** (-63) | 2.9 | 20,026 |

Hi-IO is a binary variable equal to 1 for the top quintile of INT, where INT=Total Intangible Assets-Goodwill. Intangible assets other than goodwill mainly includes but is not limited to, brand recognition, intellectual property such as patents, trademarks, and copyrights.

*, **, *** Represent statistical significance level at 10 percent, 5 percent and 1 percent level.

In order to turn these strategic resources into innovative capital, companies require practical and sophisticated executive knowledge. MA is positively related to R&D to sales and SG&A to sales in Table 16.

## IV.IV. Innovation and the Product Life Cycle

Van de Ven (1986) defines innovation as "The development and implementation of new ideas by people who over time engage in transactions with others in an institutional context." He argues that innovation requires cooperation between management, R&D departments, academic researchers, and other stakeholders. Empirical studies reveal that firms often engage in both product and process innovations, which are in turn driven by the life cycle of technology. The two types of R&D efforts have been investigated separately (Lambertini and Mantovani, 2010). High-tech companies need an organizational design to implement strategies in volatile situations, short product life cycles, and global competition. Technology and expertise are needed to transform an innovative idea into a business product (Van de Ven, 1986). Managers have to come up with innovative ideas that give a competitive advantage (Porter 1983). In a dynamic, high-tech environment, product development is an ongoing process in which goods pass through product testing, technology process, complex production lines and marketing (Hughes 1990, Karlsson 1998; Karlsson and Nyström, 2003).

Research shows that short product life cycle (PLC) is a prominent characteristic of high-tech products and businesses (Goldman 1982, Ansoff and Stewart 1967, Karlsson 1998). The complex challenges facing tech-based businesses is created by the generation and development of new high-tech services and products. A steep rate of decline in earnings and sales and a short maturation stage are standard features. Companies doing business in industries with short PLCs need to set up a business strategy that involves high levels of marketing, high levels of managerial ability, sophistication, and large amounts of capital and intangible investment in strategic physical and intangible resources. Goldman points out the R&D advantages needed by

tech-based short PLC firms to excel in competition. Since the smaller high-tech firms lack assets and resources, they need better management skills to compensate for shortages in resources.

In Goldman's (1982) eyes, it is well known that many high-tech startups and small businesses fail. In general, the high default and failure rate of the products and the risky nature of high-tech industries is to blame (Urban and Hauser 1980). While Goldman attributes its short PLC properties mainly to small tech firms, my work associates short PLC with large negative BTD firms and not necessarily small startups. The length of the product life cycle varies for different service/product types. For example, the life cycle may depend on the complexity and power of the hardware, the innovation built into the product or the pace of new technology. For capital-intensive products, the product life cycles are much longer, as manufacturers can lock in long term contracts with large customers to continue offering support services. On the other hand, many of these capital-intensive businesses are involved in commodity-based industries such as mining, energy extraction, natural resources, which have theoretically indefinite PLCs. For software, the life expectancy is shorter, as many producers support multiple versions of a product and new version are lunched annually, as it is easier and cheaper to upgrade software with a new version.

During the early stages of the industry life cycle, there is a high amount of innovative activity, and new enterprises tend to have a relatively creative advantage. There tends to be less productive innovative activity during the mature stages of the industry life cycle (Winter 1984, Klepper 1996). In contrast, the more mature stages of the industry life cycle correspond with capital intensive investments. During the early stages of the industry life cycle, there is a high volume of innovative and new knowledge productive activity. The creative activity would be

expected to be relatively high during the early stages of the product life cycle and then decline as the industry evolves towards maturity.

**LNBTDs and the Product Life Cycle**

I now turn my attention to book tax differences and the product life cycle of R&D-intensive, innovative companies. As a new product is being developed, new strategic assets are developed and purchased, and as the product moves through its life cycle and eventually dies off, the assets specifically associated with that product or service, including strategic assets like R&D process, patents, goodwill or other intangible assets (Filson 2002) as well as physical assets that support production and distribution lose their value. Therefore, I expect asset write-downs, goodwill write-offs, and termination of physical capital assets in this stage. Large amounts of losses and expenses naturally appear on the company's financial income statement, pushing book income down faster than taxable income, creating transitory LNBTDs. The development of new products brings with it the write-downs of older revenue-generating physical assets and the write-off of intangible assets associated with older products. In transition phases where companies move from older products to newer ones, I often observe sales and earnings volatility in the form of sales decline and lower earnings persistence.

**Table 18- Failure Probability based on Altman and Ohlson Models-Probit Regression**

| Variables | Pro F >50% | Z-stat | Prob O <20% | Z-stat | Hi Z Z>7 | Z-stat | Low Z Z<2.5 | Z-stat |
|---|---|---|---|---|---|---|---|---|
| LNBTD | -0.233*** | -3.32 | -0.085 | -1.21 | 0.095 | 1.21 | -0.65*** | -4.19 |
| LPBTD | 0.032 | 0.46 | -0.099 | -1.24 | -0.423*** | -4.62 | 0.101 | 0.76 |
| CAPX | -5.369*** | -8.10 | 4.338*** | 5.87 | 9.438*** | 11.12 | -1.609 | -1.46 |
| R&D | -1.721* | -1.94 | 3.93*** | 5.06 | 9.469*** | 11.07 | -14.061*** | -5.57 |
| SG&A | -0.574*** | -4.78 | 0.007 | 0.06 | -0.216 | -1.59 | -5.410*** | -11.96 |
| PP&E | 1.849*** | 9.40 | -3.34*** | -13.49 | -3.15*** | -10.75 | 1.414*** | 3.88 |
| PTBI | -19.579*** | -20.04 | 16.37*** | 15.74 | 21.14*** | 18.70 | -33.770*** | -16.49 |
| Intangible Assets | 1.970*** | 11.04 | -3.505*** | -16.51 | -1.271*** | -5.38 | 1.628*** | 5.06 |
| COGS | 0.378*** | 10.34 | -0.609*** | -12.79 | 0.236*** | 6.38 | -2.429*** | -16.60 |
| Retained Earning | -1.838*** | -19.36 | 1.48*** | 15.61 | 2.149*** | 19.42 | -5.160*** | -24.08 |
| CASH | -3.555*** | -12.11 | 2.72*** | 11.28 | 4.101*** | 15.63 | -7.270*** | -9.23 |
| Operating Income | 15.830*** | 16.94 | -11.88*** | -11.71 | -6.630*** | -6.23 | 2.581 | 1.57 |
| Revenue (Log) | -0.763*** | -5.29 | 0.830*** | 5.40 | 1.038*** | 5.81 | -0.839*** | -3.53 |
| Intercept | -0.397*** | -3.31 | -0.318** | -2.55 | -4.200*** | -27.51 | 4.569*** | 15.62 |
| $R^2$ (%) | 23.3 | | 27.7 | | 38.8 | | 57.6 | |
| No. | 9,994 | | 9,994 | | 9,994 | | 9,994 | |

*, **, *** Represent statistical significance level at 10 percent, 5 percent and 1 percent level.

## IV.V. Findings, Contributions and Limitations

After testing for financial distress, shake-out and decline stages of firm life cycle, and big-bath earnings management, I do not find that LNBTDs are characterized by financial distress, high risk of default or aging corporate life cycle. I offer an alternative theory: LNBTD observations represent research-intensive, innovative growth firms producing high-tech products with short life cycles, and the LNBTD firm-year observation is an outcome of these short product life cycles where businesses amortize and write off strategic assets and resources associated with those products or services such as product patents, intellectual property rights, impaired goodwill, idle intangible assets, and physical assets. To support my proposition, I investigate LNBTD features and attributes, such as asset and resource composition, product characteristics, liquidity, risk, growth, and management capability. The results fit my hypothesis and shed light on the characteristics and attributes of this group of firms. For example, I find the association between BTD (LNBTD) and MA-score is significant and negative (positive).

The PLC theory aligns with my findings and explains the high sales growth and MA scores observed for LNBTD businesses. High-tech and short PLC businesses require managers to promote and apply their unique skills to improve operational activities and optimize the product life cycle. High product turnover and a short product life cycle feature high-tech, high-growth firms. Cyclical sales declines and earnings volatility are signs of transition from old products to new ones. This transition comes with introducing new R&D investments, promotion and sales expenditures, and the creation of other intangible assets.

# CHAPTER FIVE

# V. Conclusion

## V.I. Thesis Summary

The literature consistently documents associations between book tax differences and firm characteristics, with particular emphasis on large book tax difference observations. Interest in these studies partly stems from a branch of accounting research interested in earnings management actions. More accurately, this line of work focuses on explaining the effects of large book tax differences from a management discretion perspective. For example, Hanlon (2005) investigates earnings, accruals, and cash flow persistence for firms with large positive and negative book tax differences. Her results suggest large book tax differences reduce persistence regardless of their direction. Further, she argues that the persistence reduction caused by large book tax differences is consistent with book tax differences indicating lower earnings quality.

Similarly, Blaylock et al. (2012) examine the role of large positive book tax differences in reducing earnings persistence and find that book tax differences that arise from earnings management reduce earnings persistence (Hanlon, 2005; Blaylock et al. 2012). This argument, based on income-increasing discretionary accruals, is less relevant for large negative BTDs than large positive book tax differences. Other researchers have considered the role of firm life cycle in determining high book tax differences and low earnings persistence (Drake 2012). Drake shows that the high association between large BTDs and lower earnings persistence goes away when firm life cycle is controlled for. This indicates that firm-level life-cycle variables pull power away from the LPBTD and LNBTD samples.

In my thesis, I re-examine the question why large negative and large positive book tax differences (BTDs) are associated with lower earnings persistence. I start by looking at the BTD profile of industries and find that companies in industries characterized by high capital expenditures (HiCAPX) are prominent in the large positive BTD (LPBTD) sample and companies in industries characterized by high research and development expenditure (HiR&D) are prominent in the large negative (LNBTD) sample. I formalize these findings by forming quintiles based on CAPX and R&D and find that the frequency of high CAPX companies in the LPBTD sample is significantly higher than expected and that the frequency of high R&D companies in the LNBTD sample is higher than expected if companies were uniformly distributed across the BTD quintiles. However, I observe that high discretionary accruals (DA), a proxy for earnings management, are uniformly distributed among the LPBTD, LNBTD, and the small BTD samples. Controlling for the effects of discretionary accruals, I argue and find that the lower persistence in the large BTD subsets, which the Hanlon literature attributes to accruals management, is picked up by high CAPX and R&D firm-year observations. This is consistent with previous work that finds lower earnings persistence for high growth firms making long-term investments in fixed assets and intangible assets through capital and R&D expenditure.

I estimate a model that relates earnings persistence to large positive and negative BTDs. First, I replicate Hanlon's model and finding that large NBTD/PBTD firms have lower earning persistence than the overall sample. I then follow the Blaylock et al. (2012) who created quintiles to identify high EM firms and high TA firms. As mentioned above, I rank the continuous CAPX and R&D variables and set up quintiles to identify high CAPX firms and high R&D firms. Blaylock et al. (2012) separated the high EM firms, calling them earnings managers, from the high TA firms, calling them tax avoiders, by assigning firms to the high EM and high TA

quintiles. Limiting their analysis to the large positive BTD sample, Blaylock et al. (2012) report significantly lower persistence for companies with high EM but not for the TA companies. I directly relate earnings persistence to CAPX and R&D and find that earnings persistence decreases with both CAPX and R&D. The coefficients become significantly larger when I interact CAPX and R&D with the large negative/positive BTD variables.

Accrual quality may be associated with firm and industry characteristics without intentional earnings management. This distinction is essential because such traits are likely to be both observable (volatility and persistence), compared to the determinants of managerial opportunism that are often unobservable (moral hazard concern), and positive signals of improvements in future accruals. My thesis research offers an alternative explanation to the hypothesis that observed lower accruals persistence indicate tax or earnings manipulation for the large negative and large positive quintiles of the BTD distribution. These earnings results need not be due to tax avoidance and earnings management. However, they may be due to disruptions in operations, the inherent characteristics of these industries, irreversible investments in R&D and CAPX, and the fixed versus variable cost structure of highly leveraged operations. CAPX and R&D, on the other hand, are related to LPBTD and LNBTD. Thus, the same characteristics in highly capital intensive (HiCAPX) and R&D intensive industries (HiR&D) that drive the persistence results contribute to the large abnormal book tax gaps because of regulation differences between the tax rules and GAAP. All three operations variables, CAPX, R&D, and sales down (SD) signify lower persistence levels.

As previously discussed, the case for the negative BTD side is not as compelling as the large positive BTD side. When the taxable income is larger than book income, it means the firm has neither engaged in tax avoidance nor income-increasing earnings management. Also, the use of

accruals levels and changes variables as proxies for firm earnings management would not be plausible for the case of large negative BTDs. The reason is that this subset is populated with high-tech, R&D intensive firms with low cash flow and high accruals amounts. The nature of these industries and the business model dictates high accruals in the income statement and balance sheet. Two disruptive sources of negative book tax differences are asset write-downs and goodwill impairments. Such actions are not repeated every year and are not expected to persist. Bad debt and warranty provisions are other sources of negative book tax differences.

This suggests negative book tax differences related to warranties, asset write-downs, impairments (common traits of businesses with short product life cycles), premium product, process innovation, and highly advanced technology industries. A sub-sector within LNBTDs is the SaaS business, or software, as a service industry. SaaS products are software products offered to customers through the web to access the product from a web or mobile browser. The product's provider manages and updates the software based on user needs. Customers pay upfront for a service or product yet to be delivered for tasks completed in the SaaS model. When a SaaS business collects money before providing a service, it needs to defer revenue recognition until it has fulfilled its customer obligations. This means that unearned (deferred) income ends up as a line item on the balance sheet. Until the service is provided, it's a liability and creates a book tax difference.

## V.II. Contribution and Limitations

My dissertation study contributes to three streams of scholarly literature. I first contribute to the Hanlon (2005) and Blaylock et al. (2012) earnings persistence literature by introducing an alternative explanation based on firm growth and investment uncertainty. By studying the cash flow components, I identify a non-accrual element of persistence, which differs from the

discretionary accruals debate. Second, I contribute to the Kothari et al. (2002), and Amir et al. (2007) literature examining the relationship between CAPX/R&D and earnings quality and the discussion on capitalizing versus expending R&D. The robust growth information in Large BTDs has broad implications for the accruals anomaly literature and BTD information content studies. For example, the inclusion of growth proxies in estimating discretionary accruals can potentially increase the explanatory power in various accruals detection models such as the Jones model.

I also contribute to the BTD literature by identifying the major drivers for abnormal temporary differences between book and tax income, especially on the negative BTD side. My work recognizes the need for expanded disclosure about deferred tax assets (liabilities). Detailed disclosure of the deferred tax assets and liabilities components, and a reconciliation of the total change to the deferred tax expense, would facilitate additional information and findings. CAPX and R&D are only two leading accounting items creating large BTDs. Future work can identify and look further into this matter, explaining the accrual and cash flow persistence findings. Also, previous research on the negative side of book tax differences is limited, and I emphasize the need to explore further and scrutinize this BTD sub sample.

Current BTD research does not fully comprehend how and why large negative BTDs are generated. LNBTDs occur when "book" income reported under generally accepted accounting principles is lower than "taxable" income computed based on the application of tax rules. LNBTDs are an interesting irregularity because prior research indicates that managers prefer to report higher book income and lower taxable income. Thus, LNBTDs occur either because of unintended circumstances - declining performance leading to losses for book before tax loss recognition, or because of risky strategic engagement- periodic disruptions in performance

because losses are recognized for book as part of innovation cycles. So, another contribution of this thesis is to study the features, determinants, and characteristics of large negative book tax differences. The direction of the BTD sign change, whether from positive to negative or from negative to positive, can be as important as the size and magnitude (see Klassen and Mawani, 2000).

Finally, I believe there is potential for improvements in the earnings BTD literature for future researchers. First, the literature has concentrated on the large positive BTD subsets. Second, the literature had not addressed the large negative BTD puzzle. As noted by Hanlon, the appearance of a large negative BTD subset is contradictory to both upward earnings management and corporate tax avoidance hypotheses. Third, this literature has yet to address the relation between managerial ability and the (BTD-PTBI) interaction. Another critical variable to consider is loss carryovers. Loss carryforwards can significantly reduce income taxes paid in years with positive profits, increasing BTD. The (LOSS-CFWD) subset might be an interesting subset to include in the various regression models and could potentially expand future research.

# References


Agarwal, Rajshree, and Michael Gort. "Firm and product life cycles and firm survival." *American Economic Review* 92, no. 2 (2002): 184-190.

Agarwal, Ratshree, Mitrabarun B. Sarkar, and Raj Echambadi. "The conditioning effect of time on firm survival: An industry life cycle approach." *Academy of Management Journal* 45, no. 5 (2002): 971-994.

Ahmed, Kamran, and Haim Falk. "The riskiness of future benefits: The case of capitalization of R&D and capital expenditures." *Journal of International Accounting Research* 8, no. 2 (2009): 45.

Allen, Eric J., Chad R. Larson, and Richard G. Sloan. "Accrual reversals, earnings and stock returns." *Journal of Accounting and Economics* 56, no. 1 (2013): 113-129.

Altman, Edward I. "Railroad bankruptcy propensity." *The Journal of Finance* 26.2 (1971): 333-345.

Altman, Edward I. "Financial ratios, discriminant analysis and the prediction of corporate bankruptcy." *The Journal of Finance* 23, no. 4 (1968): 589-609.

Altman, Edward I., Robert G. Haldeman, and Paul Narayanan. "A new model to identify bankruptcy risk of corporations." *Journal of Banking and Finance* 1, no. 1 (1977): 29-54.

Amir, Eli, Yanling Guan, and Gilad Livne. "The association of R&D and capital expenditures with subsequent earnings variability." *Journal of Business Finance & Accounting* 34, no. 1-2 (2007): 222-246.

Amit, R., and P. Shoemaker. "Specialized assets and organizational rent." *Strategic Management Journal* 14, no. 1 (1993): 33-47.

Anderson, Mark C., Rajiv D. Banker, and Surya N. Janakiraman. "Are selling, general, and administrative costs “sticky”?." *Journal of Accounting Research* 41, no. 1 (2003): 47-63.

Anderson, M., R. Banker, T. Frost and M. Tripathi. 2021. Conservatism Scores and the Operating Cycle: The role of Business Strategy. Working paper, Temple University.

Ansoff, H. Igor, and John M. Stewart. "Strategies for a technology-based business." *Harvard Business Review* 45, no. 6 (1967): 71-83.

Ayers, Benjamin C., Stacie Kelley Laplante, and Sean T. McGuire. "Credit ratings and taxes: The effect of book–tax differences on ratings changes." *Contemporary Accounting Research* 27, no. 2 (2010): 359-402.

Banker, Rajiv D., and Lei Chen. "Predicting earnings using a model based on cost variability and cost stickiness." *The Accounting Review* 81, no. 2 (2006): 285-307.

Banker, Rajiv D., Sudipta Basu, and Dmitri Byzalov. "Implications of impairment decisions and assets' cash-flow horizons for conservatism research." *The Accounting Review* 92, no. 2 (2017): 41-67.

Banker, Rajiv D., Sudipta Basu, Dmitri Byzalov, and Janice Chen. "The confounding effect of cost stickiness in conservatism research." AAA, 2015.

Banker, Rajiv D., Shunlan Fang, and Mihir N. Mehta. "Anomalous Operating Performance During Economic Slowdowns." *Journal of Management Accounting Research* 32, no. 2 (2020): 57-83.

Banker, Rajiv D., Shunlan Fang, and Mihir Mehta. 2015. “Cost behavior during economic downturns.” Working paper, Temple University.

Ball, Ray, and Lakshmanan Shivakumar. "Earnings quality in UK private firms: comparative loss recognition timeliness." *Journal of Accounting and Economics* 39, no. 1 (2005): 83-128.

Ball, Ray, and Lakshmanan Shivakumar. "The role of accruals in asymmetrically timely gain and loss recognition." *Journal of Accounting Research* 44, no. 2 (2006): 207-242.

Barney, Jay. "Firm resources and sustained competitive advantage." *Journal of Management* 17, no. 1 (1991): 99-120.

Basu, Sudipta. "The conservatism principle and the asymmetric timeliness of earnings1." *Journal of Accounting and Economics* 24, no. 1 (1997): 3-37.

Blackburne, Terrence, and Jennifer Blouin. "Understanding the informativeness of book tax differences." Proceedings UCLA. UCLA, Los Angeles, Oct (2016): 1-30.

Blaylock, Bradley, Terry Shevlin, and Ryan J. Wilson. "Tax avoidance, large positive temporary book tax differences, and earnings persistence." *The Accounting Review* 87, no. 1 (2012): 91-120.

Burgstahler, David, and Ilia Dichev. "Earnings management to avoid earnings decreases and losses." *Journal of Accounting and Economics* 24, no. 1 (1997): 99-126.

Chambers, Dennis, Ross Jennings, and Robert B. Thompson. "Excess returns to R&D-intensive firms." *Review of Accounting Studies* 7, no. 2 (2002): 133-158.

Chan, Louis KC, Josef Lakonishok, and Theodore Sougiannis. "The stock market valuation of research and development expenditures." *The Journal of Finance* 56, no. 6 (2001): 2431-2456.

Chen, Miao-Ling, Chi-Lu Peng, and An-Pin Wei. "Advertising, research and development, and capital market risk: higher risk firms versus lower risk firms." *Journal of Business Economics and Management* 13, no. 4 (2012): 724-744.

Christensen, C. M. 1999. Innovation and the general manager. Irwin Professional Pub.

Chronéer, Diana, and Bjarne Bergquist. "Managerial complexity in process industrial R&D projects: A Swedish study." *Project Management Journal* 43, no. 2 (2012): 21-36.

Ciftci, Mustafa, and Taisier A. Zoubi. "The magnitude of sales change and asymmetric cost behavior." *Journal of Management Accounting Research* 31, no. 3 (2019): 65-81.

Cooper, Robin, and Robert S. Kaplan. "Activity-based systems: Measuring the costs of resource usage." *Accounting Horizons* 6, no. 3 (1992): 1-13.

Crabtree, Aaron, and John J. Maher. "The influence of differences in taxable income and book income on the bond credit market." *Journal of the American Taxation Association* 31, no. 1 (2009): 75-99.

Dechow, Patricia, Weili Ge, and Catherine Schrand. "Understanding earnings quality: A review of the proxies, their determinants and their consequences." *Journal of Accounting and Economics* 50, no. 2-3 (2010): 344-401.

Dechow, Patricia M. "Accounting earnings and cash flows as measures of firm performance: The role of accounting accruals." *Journal of Accounting and Economics* 18, no. 1 (1994): 3-42.

Dechow, Patricia M., Richard G. Sloan, and Amy P. Sweeney. "Detecting earnings management." *The Accounting Review* (1995): 193-225.

Dechow, Patricia M., and Ilia D. Dichev. "The quality of accruals and earnings: The role of accrual estimation errors." *The Accounting Review* 77, no. s-1 (2002): 35-59.

Demerjian, Peter, Baruch Lev, and Sarah McVay. "Quantifying managerial ability: A new measure and validity tests." *Management Science* 58, no. 7 (2012): 1229-1248.

Demerjian, Peter R., Baruch Lev, Melissa F. Lewis, and Sarah E. McVay. "Managerial ability and earnings quality." *The Accounting Review* 88, no. 2 (2013): 463-498.

Desai, Mihir A. "The divergence between book income and tax income." *Tax Policy and the Economy* 17 (2003): 169-206.

Desai, Mihir A. "The degradation of reported corporate profits." *Journal of Economic Perspectives* 19, no. 4 (2005): 171-192.

Desai, Hemang, Shivaram Rajgopal, and Mohan Venkatachalam. "Value-glamour and accruals mispricing: One anomaly or two?" *The Accounting Review* 79, no. 2 (2004): 355-385.

Desai, Mihir A., and Dhammika Dharmapala. "Corporate tax avoidance and high-powered incentives." *Journal of Financial Economics* 79, no. 1 (2006): 145-179.

Desai, Mihir A., and Dhammika Dharmapala. "Corporate tax avoidance and firm value." *The Review of Economics and Statistics* 91, no. 3 (2009): 537-546.

Dichev, Ilia D. "Is the risk of bankruptcy a systematic risk?" *The Journal of Finance* 53, no. 3 (1998): 1131-1147.

Dichev, Ilia D., and Vicki Wei Tang. "Earnings volatility and earnings predictability." *Journal of Accounting and Economics* 47, no. 1-2 (2009): 160-181.

Dickinson, Victoria. "Cash flow patterns as a proxy for firm life cycle." *The Accounting Review* 86, no. 6 (2011): 1969-1994.

Drake, Katharine D. "Does firm life cycle explain the relation between book tax differences and earnings persistence?" PhD diss., Arizona State University, 2012.

Dyreng, Scott D., Michelle Hanlon, and Edward L. Maydew. "Long-run corporate tax avoidance." *The Accounting Review* 83, no. 1 (2008): 61-82.

Erickson, M., Hanlon, M., & Maydew, E. L. (2004). How much will firms pay for earnings that do not exist? Evidence of taxes paid on allegedly fraudulent earnings. *The Accounting Review*, 79(2), 387-408.

Fairfield, Patricia M., J. Scott Whisenant, and Teri Lombardi Yohn. "Accrued earnings and growth: Implications for future profitability and market mispricing." *The Accounting Review* 78, no. 1 (2003): 353-371.

Filson, Darren. "Product and process innovations in the life cycle of an industry." *Journal of Economic Behavior & Organization* 49, no. 1 (2002): 97-112.

Frank, Mary Margaret, Luann J. Lynch, and Sonja Olhoft Rego. "Tax reporting aggressiveness and its relation to aggressive financial reporting." *The Accounting Review* 84, no. 2 (2009): 467-496.

Frankel, Richard, and Lubomir Litov. "Earnings persistence." *Journal of Accounting and Economics* 47, no. 1-2 (2009): 182-190.

Gilbert, Lisa R., Krishnagopal Menon, and Kenneth B. Schwartz. "Predicting bankruptcy for firms in financial distress." *Journal of Business Finance & Accounting* 17, no. 1 (1990): 161-171.

Goldman, Arieh. "Short product life cycles: implications for the marketing activities of small high-technology companies." *R&D Management* 12, no. 2 (1982): 81-90.

Guay, Wayne R., S. P. Kothari, and Ross L. Watts. "A market-based evaluation of discretionary accrual models." *Journal of Accounting Research* 34 (1996): 83-105.

Guay, Wayne. "Discussion of the role of accruals in asymmetrically timely gain and loss recognition." *Journal of Accounting Research* 44, no. 2 (2006): 243-255.

Guenther, David A., Edward L. Maydew, and Sarah E. Nutter. "Financial reporting, tax costs, and book tax conformity." *Journal of Accounting and Economics* 23, no. 3 (1997): 225-248.

Guenther, David. "What do we learn from large book tax differences." *Lundquist College of Business, University of Oregon, unveröffentlichtes Manuskript* (2011).

Guenther, David A. "Measuring corporate tax avoidance: Effective tax rates and book tax differences." Available at SSRN 2478952 (2014).

Gul, Ferdinand A., Mehdi Khedmati, Edwin KiaYang Lim, and Farshid Navissi. "Managerial ability, financial distress, and audit fees." *Accounting Horizons* 32, no. 1 (2018): 29-51.

Hanlon, Michelle. "The persistence and pricing of earnings, accruals, and cash flows when firms have large book-tax differences." *The Accounting Review* 80, no. 1 (2005): 137-166.

Hanlon, Michelle, and Shane Heitzman. "A review of tax research." *Journal of Accounting and Economics* 50, no. 2-3 (2010): 127-178.

Healy, Paul M. "The effect of bonus schemes on accounting decisions." *Journal of Accounting and Economics* 7, no. 1-3 (1985): 85-107.

Healy, Paul. "Discussion of a market-based evaluation of discretionary accrual models." *Journal of Accounting Research* 34 (1996): 107-115.

Healy, Paul M., and James M. Wahlen. "A review of the earnings management literature and its implications for standard setting." *Accounting Horizons* 13, no. 4 (1999): 365-383.

Hovakimian, Armen, Tim Opler, and Sheridan Titman. "The debt-equity choice." Journal of Financial and Quantitative analysis (2001): 1-24.

Hughes, G. David. "Managing high-tech product cycles." *Academy of Management Perspectives* 4, no. 2 (1990): 44-55.

Hunt, Alister, Susan Moyer, and Terry Shevlin. "Earnings volatility, earnings management, and equity value." Unpublished working paper. University of Washington (2000).

Jayaraman, Sudarshan. "Earnings volatility, cash flow volatility, and informed trading." *Journal of Accounting Research* 46, no. 4 (2008): 809-851.

Jackson, Andrew B. "Discretionary accruals: earnings management... or not?." *Abacus* 54, no. 2 (2018): 136-153.

Jensen, Paul H., and Elizabeth Webster. "Another look at the relationship between innovation proxies." *Australian Economic Papers* 48, no. 3 (2009): 252-269.

Jones, Jennifer J. "Earnings management during import relief investigations." *Journal of Accounting Research* 29, no. 2 (1991): 193-228.

Jones, A., and T. Noga. Book tax Differences as an Indicator of Financial Distress. Working paper, Bentley University, 2009.

Joos, Peter, Jamie Pratt, and D. Young. "Book tax differences and the value relevance of earnings." Massachusetts Institute of Technology, Indiana University, and INSEAD, Working Paper (2000).

Jordan, Charles E., and Stanley J. Clark. "Big bath earnings management: the case of goodwill impairment under SFAS No. 142." *Journal of Applied Business Research (JABR)* 20, no. 2 (2004).

Karlsson, Charlie. "Innovation adoption and the product life cycle." PhD diss., Umeå universitet, 1988.

Karlsson, Charlie, and Kristina Nyström. "Exit and entry over the product life cycle: Evidence from the Swedish manufacturing industry." *Small Business Economics* 21, no. 2 (2003): 135-144.

Keizer, Jimme A., Jan-Peter Vos, and Johannes IM Halman. "Risks in new product development: devising a reference tool." *R&D Management* 35, no. 3 (2005): 297-309.

Khazanchi, Shalini, Marianne W. Lewis, and Kenneth K. Boyer. "Innovation-supportive culture: The impact of organizational values on process innovation." *Journal of Operations Management* 25, no. 4 (2007): 871-884.

Klassen, Kenneth J., and Amin Mawani. "The impact of financial and tax reporting incentives on option grants to Canadian CEOs." *Contemporary Accounting Research* 17, no. 2 (2000): 227-262.

Klepper, Steven. "Entry, exit, growth, and innovation over the product life cycle." *The American Economic Review* (1996): 562-583.

Koester, Allison, Terry Shevlin, and Daniel Wangerin. "The role of managerial ability in corporate tax avoidance." *Management Science* 63, no. 10 (2017): 3285-3310.

Kothari, S. P., Ted E. Laguerre, and Andrew J. Leone. "Capitalization versus expensing: Evidence on the uncertainty of future earnings from capital expenditures versus R&D outlays." *Review of Accounting Studies* 7, no. 4 (2002): 355-382.

Kotter, John P. "Leading change: Why transformation efforts fail." (1995): 59-67.

Kerstein, Joseph, and Sungsoo Kim. "The incremental information content of capital expenditures." *The Accounting Review* (1995): 513-526.

Lambertini, Luca, and Andrea Mantovani. "Process and product innovation: A differential game approach to product life cycle." *International Journal of Economic Theory* 6, no. 2 (2010): 227-252.

Lawrence, Alastair, Richard Sloan, and Estelle Sun. "Why are losses less persistent than profits? Curtailments vs. conservatism." *Management Science* 64, no. 2 (2018): 673-694.

Lenter, David, Joel Slemrod, and Douglas Shackelford. "Public disclosure of corporate tax return information: Accounting, economics, and legal perspectives." *National Tax Journal* (2003): 803-830.

Lennox, Clive, Petro Lisowsky, and Jeffrey Pittman. "Tax aggressiveness and accounting fraud." *Journal of Accounting Research* 51, no. 4 (2013): 739-778.

Lev, Baruch, and S. Ramu Thiagarajan. "Fundamental information analysis." *Journal of Accounting Research* 31, no. 2 (1993): 190-215.

Lev, Baruch, and Theodore Sougiannis. "The capitalization, amortization, and value-relevance of R&D." *Journal of Accounting and Economics* 21, no. 1 (1996): 107-138.

Lev, Baruch, and Doron Nissim. "Taxable income, future earnings, and equity values." *The Accounting Review* 79, no. 4 (2004): 1039-1074.

Lev, Baruch, Doron Nissim, and Jacob Thomas. "On the informational usefulness of R&D capitalization and amortization." In Visualising intangibles: Measuring and reporting in the knowledge economy, pp. 111-142. Routledge, 2016.

Mahoney, Joseph T., and J. Rajendran Pandian. "The resource-based view within the conversation of strategic management." *Strategic Management Journal* 13, no. 5 (1992): 363-380.

Manzon Jr, Gil B., and George A. Plesko. "The relation between financial and tax reporting measures of income." *Tax L. Rev.* 55 (2001): 175.

McConnell, John J., and Chris J. Muscarella. "Corporate capital expenditure decisions and the market value of the firm." *Journal of Financial Economics* 14, no. 3 (1985): 399-422.

Michalisin, Michael D., Robert D. Smith, and Douglas M. Kline. "In search of strategic assets." *The International Journal of Organizational Analysis* (1997).

Mills, Lillian F. "Book tax differences and Internal Revenue Service adjustments." *Journal of Accounting Research* 36, no. 2 (1998): 343-356.

Mills, Lillian F., and Kaye J. Newberry. "The influence of tax and nontax costs on book-tax reporting differences: Public and private firms." *Journal of the American Taxation Association* 23, no. 1 (2001): 1-19.

Mills, Lillian F., Kaye J. Newberry, and William B. Trautman. "Trends in book tax income and balance sheet differences." *Available at SSRN 313040* (2002).

Miller, Danny, and Peter H. Friesen. "A longitudinal study of the corporate life cycle." *Management Science* 30, no. 10 (1984): 1161-1183.

Noga, Tracy J., and Anne L. Schnader. "Book tax differences as an indicator of financial distress." *Accounting Horizons* 27, no. 3 (2013): 469-489.

Ohlson, James A. "Financial ratios and the probabilistic prediction of bankruptcy." *Journal of Accounting Research* (1980): 109-131.

Opler, Tim C., and Sheridan Titman. "Financial distress and corporate performance." *The Journal of Finance* 49.3 (1994): 1015-1040.

Penman, Stephen H., and Stephen H. Penman. Financial statement analysis and security valuation. Vol. 3. New York: McGraw-Hill, 2007.

Penman, Stephen H., and Xiao-Jun Zhang. "Accounting conservatism, the quality of earnings, and stock returns." *The Accounting Review* 77, no. 2 (2002): 237-264.

Peters, Ryan H., and Lucian A. Taylor. "Intangible capital and the investment-q relation." *Journal of Financial Economics* 123, no. 2 (2017): 251-272.

Phillips, John, Morton Pincus, and Sonja Olhoft Rego. "Earnings management: New evidence based on deferred tax expense." *The Accounting Review* 78, no. 2 (2003): 491-521.

Phillips, John D., Morton Pincus, Sonja Olhoft Rego, and Huishan Wan. "Decomposing changes in deferred tax assets and liabilities to isolate earnings management activities." *Journal of the American Taxation Association* 26, no. s-1 (2004): 43-66.

Porter, Michael E. "The technological dimension of competitive strategy, Research on Technological Innovation, Management and Policy, vol. 1." (1983): 1-33.

Poterba, James, Nirupama Rao, and Jeri Seidman. The significance and composition of deferred tax assets and liabilities. National Bureau of Economic Research, 2007.

Richardson, Scott A., Richard G. Sloan, Mark T. Soliman, and I˙ rem Tuna. "The implications of accounting distortions and growth for accruals and profitability." *The Accounting Review* 81, no. 3 (2006): 713-743.

Roychowdhury, Sugata. "Earnings management through real activities manipulation." *Journal of Accounting and Economics* 42, no. 3 (2006): 335-370.

Santomero, Anthony M., and Joseph D. Vinso. "Estimating the probability of failure for commercial banks and the banking system." *Journal of Banking & Finance* 1, no. 2 (1977): 185-205.

Seida J. Enron: The Joint Committee on Taxation's Investigative Report. Testimony before the US Senate, Finance Committee. 2003 Feb 13.

Seidman, Jeri K. 2010. "Interpreting the book tax income gap as earnings management or tax sheltering." McCombs Research Paper Series No. ACC-02-10 (2010).

Shi, Charles. "On the trade-off between the future benefits and riskiness of R&D: A bondholders' perspective." *Journal of Accounting and Economics* 35, no. 2 (2003): 227-254.

Shumway, Tyler Graham. "The premium for default risk in stock returns." PhD diss., University of Chicago Graduate School of Business, 1996.

Shumway, Tyler. "Forecasting bankruptcy more accurately: A simple hazard model." *The Journal of Business* 74, no. 1 (2001): 101-124.

Sikora, M. "Timing a'big bath'to an acquisition." Mergers & Acquisitions: *The Dealermaker's Journal* 33, no. 6 (1999): 8-9.

Sloan, Richard G. "Do stock prices fully reflect information in accruals and cash flows about future earnings?." *The Accounting Review* (1996): 289-315.

Tang, Tanya YH, and Michael Firth. "Earnings persistence and stock market reactions to the different information in book tax differences: Evidence from China." *The International Journal of Accounting* 47, no. 3 (2012): 369-397.

Urban, Glen L., Philip L. Johnson, and John R. Hauser. "Testing competitive market structures." *Marketing Science* 3, no. 2 (1984): 83-112.

Van de Ven, Andrew H. "Central problems in the management of innovation." *Management Science* 32, no. 5 (1986): 590-607.

Watts, Ross L., and Jerold L. Zimmerman. "Towards a positive theory of the determination of accounting standards." *The Accounting Review* (1978): 112-134.

Watts, Ross L., and Jerold L. Zimmerman. 1986. *Positive accounting theory.*

Waymire, G., 1985. Earnings volatility and voluntary management forecast disclosure. *Journal of Accounting Research*, pp.268-295.

Wedig, Gerard J. "How Risky is R&D? A Financial Approach." *The Review of Economics and Statistics* (1990): 296-303.

White, R. W., and M. Turnball. "The probability of bankruptcy: American railroads." Institute of Finance and Accounting, London University Graduate School of Business Working paper. 1975.

Wilcox, Jarrod W. "A prediction of business failure using accounting data." *Journal of Accounting Research* (1973): 163-179.

Wilson, Ryan J. "An examination of corporate tax shelter participants." *The Accounting Review* 84, no. 3 (2009): 969-999.

Wilson, R., 2010. Discussion of "Credit Ratings and Taxes: The Effect of Book–Tax Differences on Ratings Changes". *Contemporary Accounting Research*, *27*(2), pp.403-411.

Winter, Sidney G. "Schumpeterian competition in alternative technological regimes." *Journal of Economic Behavior & Organization* 5, no. 3-4 (1984): 287-320.

Xie, Hong. Are discretionary accruals mispriced? A reexamination. The University of Iowa, 1998.

Yin, George K. "How much tax do large public corporations pay?: Estimating the effective tax rates of the S&P 500." Virginia Law Review (2003): 1793-1856.

Zhang, F. X. What causes the accrual anomaly-Growth or earnings persistence. Working paper, University of Chicago, 2005.

Zhang, X. Frank. "Accruals, investment, and the accrual anomaly." The Accounting Review 82, no. 5 (2007): 1333-1363.

# Table Appendix

## Appendix A - Variable Definitions

| *Variable Name* | *Abbreviation* | *Variable Description* |
|---|---|---|
| *Book tax Differences* | BTD | The sum of federal and foreign deferred taxes (Compustat TXDFED and TXDFO), grossed up by the statutory tax rate (35% in my sample period), and scaled by average assets. If either federal or foreign deferred taxes are missing, total deferred taxes (Compustat TXDI) is used instead. |
| *Capital Expenditures* | CAPX | (Compustat capx) This item represents the funds used for additions to property, plant, and equipment, excluding amounts arising from acquisitions scaled by average assets |
| *Discretionary Accruals* | DA | A continuous variable, the residual value from the Jones model (1991) discretionary accruals regression scaled by average assets |
| *High Discretionary Accruals* | HiDA | A dummy variable, which is equal to one for firm-years with DA in the highest quintile of firms in each year, and zero otherwise |
| *High Capital Expenditure* | HiCAPX | A dummy variable, which is equal to one for firm-years with CAPX in the highest quintile of firms in each year, and zero otherwise |
| *High R&D Expenditure* | HiR&D | A dummy variable, which is equal to one for firm-years in the top R&D quintile firm-years observations, and zero otherwise |
| *Large negative book tax differences* | LNBTD | A dummy variable, which is equal to one for firm-years with BTD in the lowest quintile of firms in each year, and zero otherwise |
| *Large positive Book tax Differences* | LPBTD | A dummy variable, which is equal to one for firm-years with BTD in the highest quintile of firms in each year, and zero otherwise |

| | | |
|---|---|---|
| *Market to Book ratio* | MB | The price-to-book ratio compares a company's market value to its book value. The market value of a company is its share price multiplied by the number of outstanding shares. The book value is the net assets of a company. |
| *Middle Book tax Differences* | Middle BTD | A dummy variable, which is equal to one for firm-years excluding the LPBTD and LNBTD quintile firm-year observations, and zero otherwise |
| *Next period Pre-Tax Book Income* | $PTBI_{t+1}$ | Pre-tax book income (Compustat PI or IBQ) for year t+1, scaled by average assets |
| *Pre-Tax Accruals* | PTACC | The difference between PTBI and PTCF, scaled by average assets. This gives us total scaled accruals, which is different from the discretionary accruals component. |
| *Pre-Tax Book Income* | $PTBI_t$ | Pre-tax book income (Compustat PI or IBQ) for year t, scaled by average assets |
| *Pre-Tax Cash flows* | PTCF | The sum of total operating cash flows (Compustat OANCF) and cash taxes paid (Compustat TXPD), less cash flow due to extraordinary items (Compustat XIDOC), scaled by average assets |
| *Research and Development Expense* | R&D | This item represents all costs incurred during the year that relate to the development of new products or services. This item includes software expenses and amortization of software costs |

## Table 1- Variable Definition List

| *Variable Name* | *Abbreviation* | *Variable Description* |
|---|---|---|
| *Ability score* | ABIL | A quantified measure of managerial ability developed by Demerjian et al. (2012) based on managers' ability to maximize revenue generation .from a fixed set of inpu |
| *Altman Z-score* | Z | Altman's Z-Score model is a numerical measurement that is used to predict the chances of a business going bankrupt in the next two years. The Z-score is a linear combination of four or five common business ratios, weighted by coefficients. The coefficients were estimated by identifying a set of firms which had declared bankruptcy and then collecting a matched sample of firms which had survived, with matching by industry and approximate size (assets). |
| *Discretionary Accruals* | DA | A continuous variable, The residual value from the Jones model (1991) discretionary accruals regression scaled by average assets |
| *Earnings Growth* | E.G. | Current Earnings minus last year Earnings divided by last year Earnings |
| *Earnings Persistence* | - | Auto correlation between current and next period earnings time series regression. Earnings persistence measures the extent to which current earnings persist or recur in the future. High persistence indicates a sustainable earnings generation process that is particularly valued by investors. |
| *Firm Efficiency* | F.E. | Demerjian et al. (2012) estimate total firm efficiency using data envelopment analysis, a type of frontier analysis that measures relative efficiency. They then remove identifiable firm characteristics, such as size, that affect the firm's relative efficiency but are unlikely to be a direct result of the quality of management. They attribute the unexplained portion of total firm efficiency to the management team. They document that their measure outperforms existing measures of ability such as historical stock returns and media citations. |
| *High Altman Probability* | Prob O | A binary variable equal to 1 for Firm year observations with a failure probability of less than 20% (O-score<0.2), and zero otherwise. |

| | | |
|---|---|---|
| *High Discretionary Accruals* | Hi DA | A dummy variable, which is equal to one for firm-year observations with DA in the highest quintile of firms in each year, and zero otherwise |
| *High Efficiency* | Hi FE | A dummy variable, which is equal to one for firm-year observations with FE in the highest quintile of firms in each year, and zero otherwise |
| *High Managerial Ability* | Hi MA | A dummy variable, which is equal to one for firm-year observations with MA in the highest quintile of firms in each year, and zero otherwise |
| *High O-score* | Hi O | A dummy variable, which is equal to one for firm-year observations with O-score in the highest quintile of firms in each year, and zero otherwise |
| *High Tax avoidance* | Hi TA | A dummy variable, which is equal to one for firm-year observations with TA in the highest quintile of firms in each year, and zero otherwise |
| *High Z-score* | Hi Z | A dummy variable, which is equal to one for firm-year observations with Z-score in the highest quintile of firms in each year, and zero otherwise |
| *Intangible Assets other than Goodwill* | I.O. | Intangible assets other than goodwill mainly includes but is not limited to, brand recognition, intellectual property such as patents, trademarks, and copyrights. |
| *Low Managerial Ability* | Low MA | A dummy variable, which is equal to one for firm-year observations with MA in the lowest quintile of firms in each year, and zero otherwise |
| *Low Z-score* | Low Z | A dummy variable, which is equal to one for firm-year observations with Z-score in the lowest quintile of firms in each year, and zero otherwise |
| *Managerial Ability score* | MA | Decile ranked measure of managerial Ability developed by Demerjian et al. (2012) |
| *Negative Discretionary Accruals* | Neg DA | The negative values of the Discretionary Accruals variable |

| | | |
|---|---|---|
| *Ohlson's O-score* | O | The Ohlson Score uses items from the financial statement to predict the likelihood of a firm's bankruptcy. The O-Score breaks it down into nine different approximate measures of a firm's default risk, two of the nine being dummy variables: these nine are used to determine firm size, leverage, working capital, liquidity, profitability, change in net income, and debt financing. Together, these nine variables build an O-Score where the probability of failure is EXP(O-Score) divided by 1+EXP(O-score). Results greater than >.5 indicate a firm with a high chance of default. |
| *Probability of Failure* | Prob F | A binary variable equal to 1 for Firm year observations with a failure probability of more than 50% (O-score>0.5), and zero otherwise. |
| *R&D to Sales* | - | R&D expenditure divided by Total Revenue |
| *SG&A to Sales* | - | Selling, General & Administrative costs divided by Total Revenue |
| *Tax avoidance* | T.A. | Rank variable based on The Effective Tax rate measure (ETR) |