Does Firm Life Cycle Explain the Relation Between Book-Tax Differences and Earnings Persistence?

by

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ABSTRACT

Existing literature consistently documents a relationship between book-tax differences and future financial performance. Specifically, large book-tax differences are associated with lower earnings persistence. I contend that one reason the tax information contained in financial statements is informative about future earnings is that the relationship between book income and taxable income captures information about a firm's life cycle stage. Using a life cycle measure from the literature, I use fundamental analysis to group firm-year observations into life cycle stages and document a link between book-tax differences and firm life cycle. I build on prior studies that find a relation between earnings persistence and book-tax differences, and earnings persistence and firm life cycle. I find that after controlling for firm life cycle stage, the association between large positive book-tax differences and lower earnings persistence does not hold. My results offer an economic theory based explanation for the relation between book-tax differences and earnings persistence as an alternative explanation to findings in prior research.

DEDICATION

I dedicate this dissertation to my best friend and husband, Earl, for his remarkable patience and unwavering love and support throughout my career.

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Chapter 1

INTRODUCTION

Extant literature consistently finds an association between book-tax differences (BTD)[1] and both the persistence of accruals and earnings (Hanlon 2005) and future earnings growth (Lev and Nissim 2004). These findings are appealing to researchers and investors alike in that understanding the information in BTD enhances the informativeness of reported financial statement information. While researchers consistently document a relation between this tax fundamental and financial performance, the explanation for this association remains unclear. Specifically, what is it about BTD that relate to earnings persistence or future earnings growth? The consensus among researchers is that BTD can arise from a number of different sources including inherent differences between the tax and financial reporting systems, upwards earnings management, and tax planning strategies (Hanlon 2005; Lev and Nissim 2004; Blaylock et al. 2012). While they offer potential explanations, these prior studies do not provide an economic framework as to why the information contained in BTD provides information about future profitability. I offer life cycle theory as an explanation for why BTD are associated with future earnings.

Fundamental to this explanation is the hypothesis that BTD will vary predictably over the life of the firm. Life cycle research uses fundamental analysis

[1] Throughout the paper, I use the term book-tax differences to represent the temporary differences between a firm's "book" income as reported following GAAP for financial statement reporting and its taxable income. Taxable income is an estimate of a firm's taxable income from information in the financial statements. Actual income reported to taxing authorities is not observable, and thus must be estimated by researchers and investors from information contained in the financial statements. While the use of estimated taxable income induces noise into my analysis, it should not bias my results.

to identify stages across firm-year observations (i.e. introduction, growth, maturity, shake-out and decline).[2] Using an existing measure of life cycle, I find the expected variation in firm performance, including sales, ROA, cash flows, and earnings persistence across life cycle stages consistent with life cycle theory. Because firms engage in fundamentally different transactions depending on their life cycle stage, and because these transactions map into financial reporting and tax reporting differently, I expect BTD will vary across firm life cycle. I contend that BTD are a function of the natural course of business, capturing growth and decline, and are thus associated with earnings persistence. 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. On the other hand, mature firms are often thought of as "steady state," not growing nor declining, and firms in a shake-out or decline phase tend to reduce operations and sell assets. These actions reduce the level of book-tax differences incurred, again, without necessarily affecting the level of tax aggressiveness. Inherently, life cycle captures growth or decline in firm performance. Thus, I expect, and find, that temporary book-tax differences will vary predictably across life cycle stages.[3]

[2] Life cycle studies refer to the phases by varying names, and measures. I follow the naming schema from Dickinson (2011).

[3] Permanent differences between GAAP and tax are those in which items of income or expense are included in one measure but never in the other. Temporary differences, however, differ only in the *timing* of recognition of the income or expense between the two reporting systems. Permanent differences between book and tax are not necessarily associated with firm growth or decline, and therefore I do not expect permanent differences to vary predictably across life cycle stages.

This study aims to show that the negative relation between large BTD and earnings persistence documented in prior literature is, at least in part, explained by the association between BTD and firm life cycle. To document this finding, I first examine the link between BTD and firm life cycle. I then build on prior studies that find a relation between earnings persistence and BTD, and between earnings persistence and firm life cycle. I find that, controlling for firm life cycle stage, the association between large positive BTD and lower earnings persistence does not hold. Additionally, I find that, within life cycle stages the association between large negative BTD and earnings persistence does not hold. My results offer an alternative, economics-based, explanation for the relation between BTD and earnings persistence found in prior research. To ensure that my findings are not merely proxying for a prior explanation of the relation between BTD and earnings (e.g., earnings management), I also test whether the association between earnings management and positive BTD in Blaylock et al. (2012) is at least partially explained by life cycle stage.

My study answers the call in recent literature reviews for explanations as to why BTD provide information about future earnings. For example, Graham et al. (2010) comment that "we find it puzzling that the tax information in the financial statements can simultaneously communicate so little about a firm's actual taxes (as asserted by practitioners) and still influence analysts, explain future earnings and predict share prices, among other things..." (page 82). These authors call for researchers to identify *how* and *why* tax information informs investors about future earnings. Similarly, Hanlon and Heitzman (2010) call for

future research to examine the source of the information contained in BTD about future earnings. I contend that one reason the tax information contained in financial statements is informative is that it relates to a firm's life cycle stage. I test and find that firm life cycle explains variation in BTD and the observed relation between BTD and future earnings above and beyond earnings management.

This study makes three contributions. First, I contribute to the literature on book-tax differences by providing an economic framework, firm life cycle, for the results in prior research regarding the well-documented link between BTD and future earnings (e.g. Hanlon 2005). Similar to my study, Guenther (2011) identifies firm characteristics such as firm age, large special items, large accruals and changes in ROA, that explain the relation between large BTD and earnings persistence. The results of my study provide theory in which to consider Guenther's findings.

Second, my study adds to the life cycle literature by documenting another facet of firm performance, the relation between book and taxable income, that varies with firm life cycle. To my knowledge, this is the first study to marry the tax and life cycle literatures and examine BTD by firm life cycle. By expanding our understanding of BTD this study also complements prior literature that examines tax behavior in value and glamour firms by examining tax behavior across firm life cycle (e.g. Paprocki and Schnee 2004).

Third, my study adds to the tax literature by providing an explanation as to why some firms appear to avoid more taxes than others. BTD measure temporary

book-tax differences and thus high levels of BTD are associated with low cash effective tax rates (ETR), a measure of tax avoidance, resulting from the deferral of tax expense. Dyreng et al. (2008) observe variation in the level of tax avoidance among firms, proxied by cash ETR, even within the same industry. I document that both BTD and cash ETR vary systematically across life cycle stages. Historically, researchers use BTD as a measure of tax avoidance and tax aggressiveness (e.g. Badertscher et al. 2009; Cloyd 1995; Mills 1998; Wilson 2009; Cazier et al. 2009). This prior literature suggests that BTD indicate aggressive, illegitimate or uncertain tax positions. I offer evidence that cross-sectional variation in cash ETR and BTD results from fundamental differences in economic transactions at different stages of a firm's life cycle and not merely by aggressive behavior alone.

Chapter 2

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Sources of Book-Tax Differences

Firms report earnings to investors in accordance with GAAP and to the taxing authorities by the rules and regulations set forth under law. Atwood et al. (2010) identify reasons for differences in book and tax reporting, including, "financial accounting rules are generally based on the conservatism and matching principles whereas tax accounting rules are based on the ability-to-pay principle, with incentives for taxpayers to engage in specific economic activities" (page 114). One of the characteristics of GAAP accounting principles is conservatism, that is, recognizing losses when probable and measurable, and using forward-looking estimates to establish reserves. The tax code, however, does not allow for deductions until economic performance occurs or losses are realized, giving rise to temporary differences between book income and tax income. There are numerous other differences between GAAP and tax reporting, including temporary differences (e.g., depreciation, estimates and reserves) and permanent differences (e.g., tax exempt income, non-deductible expenses). Permanent differences between GAAP and tax are those in which items of income or expense are included in one measure but never in the other.[4] Temporary differences however, differ only in the *timing* of recognition of the income or expense between the two reporting systems. For example, tax reporting allows for

[4] A simple example of a permanent difference is tax exempt income from municipal bonds reported as income for GAAP, but exempt from taxable income. More complex permanent differences arise from tax credits and different tax rates on foreign income. See Schmidt (2006) for a discussion of sources of permanent differences.

accelerated depreciation for most property and equipment, but GAAP relies on matching revenues and expenses and firms often use straight-line depreciation for GAAP reporting. Over the life of the asset, the total depreciation expense will be the same under both systems, but the *timing* of the expense is different. In this study I focus on temporary BTD and the relation with firm life cycle.

Appendix A provides a summary of a number of common temporary differences between book and tax reporting and their anticipated effect on earnings persistence. By their nature, temporary differences have increasing and decreasing effects on the level of BTD. Appendix A outlines, in general, sources of BTD and whether the underlying transactions give rise to positive BTD (book income greater than taxable income) or negative BTD (taxable income greater than book income).

Beyond the different reporting requirements for each system, BTD are affected by earnings management activities (Badertscher et al. 2009; Blaylock et al. 2012; Ayers et al. 2009) and tax planning strategies (Blaylock et al. 2012; Ayers et al. 2009). Of course, most firms' BTD in any given year will be a combination of firm specific effects, inherent differences between book and tax reporting, any non-conforming earnings management activities and tax planning strategies. Given the number of different channels through which BTD can arise, researchers have struggled to interpret the economic meaning of firms' BTD and the means through which it relates to future earnings.

Informativeness of Book-Tax Differences

Beginning with Lev and Nissim (2004) and Hanlon (2005), a stream of literature examines whether BTD provide information regarding future financial performance.[5] Hanlon (2005) documents a negative association between earnings persistence and large positive and large negative BTD, which she measures using only temporary BTD. She finds that pre-tax earnings are less persistent for firm-years with large negative and large positive BTD and suggests her findings may be driven by firm characteristics, tax planning, or earnings management. To further examine whether her results are driven by earnings management, she also tests and finds that accrual earnings are less persistent for firm-years with large positive and large negative BTD, which she interprets as an indication of earnings management.

Similarly, Lev and Nissim (2004) identify a positive relation between the ratio of taxable income to book income and future earnings growth. In addition, they find that deferred tax expense is positively related to subsequent earnings growth. Lev and Nissim's (2004) measure incorporates both temporary BTD, captured in their deferred tax fundamental, and total BTD, captured by their tax fundamental. Their tests indicate that both measures capture information relevant for future earnings growth. Lev and Nissim (2004) attribute their findings to inherent differences between the two reporting systems, earnings management, or smoothing of taxable income.

[5] For a summary of the existing literature, see Hanlon and Heitzman (2010).

Other studies examine the informativeness of BTD to firm stakeholders. Ayers et al. (2010) find that both positive and negative changes in BTD are associated with decreases in firm credit ratings. They infer the change in BTD is associated with decreased earnings quality and thus it is informative to debt holders. Similarly, Comprix et al. (2011) show that large BTD are associated with market participants' uncertainty as measured by share turnover, analyst forecast dispersion, and stock return variance.

Subsequent studies further consider the source of the BTD-persistence relation. For example, Seidman (2010) finds that GAAP changes and changes to general macroeconomic business conditions affect BTD. Jackson (2011) finds that temporary BTD are related to changes in future pre-tax income. Additionally, Blaylock et al. (2012) suggest that the relation between large positive BTD and lower earnings persistence found in Hanlon (2005) is explained by earnings management. They test and find that firm-years with large positive BTD likely arising from upwards earnings management exhibit lower earnings persistence than other firms with large positive BTD.

Guenther (2011) also investigates the causes of the BTD-earnings persistence relation in Hanlon (2005). He uses "data snooping" in order to identify a small set of influential observations that drive her results. He identifies data coding errors as well as firm characteristics that impact Hanlon's findings. Guenther finds that young firms, small firms, firms with high levels of ROA, large accruals, and firms with larger transitory items (gains/losses) drive the relation between large BTD and less persistent earnings. His findings support the

notion that firm performance, age and disposition of assets impact the relation between BTD and earnings persistence.

What is it about BTD that relate to earnings persistence or future earnings growth? And how is the market able to appropriately assess this relation? Hanlon and Heitzman (2010) comment "the evidence to date suggests that book–tax differences provide information about current and future earnings (e.g., earnings persistence and future earnings growth) and potentially indicate pre-tax earnings management" (Hanlon and Heitzman 2010, pg. 128). I posit that these may not be the only reasons for this relation, but also that BTD will vary predictably over the life of a firm and that life cycle explains the earnings persistence variation across BTD groups.

Firm Life Cycle

The life cycle theory of the firm (Mueller 1972) is concerned with how a firm grows, matures, and declines. A different construct than "product" or "industry" life cycle, "firm" life cycle considers the firm as a combination of "many overlapping, but distinct, product life cycle stages" (Dickinson 2011, page 1970). The goal of life cycle analysis is to use fundamental analysis to group firm-years into similar categories and then use these categories as a framework for analyzing how varying incentives, constraints and strategies over a firm's life cycle are related to firm decisions and performance outcomes. Black (1998) notes, "firm-years in a given life cycle stage are relatively more homogenous across multiple financial characteristics than a pooling of all firm-years" (page 40). In

sum, life cycle provides an alternative economic framework in which to study firms.

Dickinson (2011) identifies five life cycle phases, introduction, growth, maturity, shake-out, and decline. She assigns firm years to the various stages using the signs of the components of the statement of cash flows. Using this measure she documents expected variation in measures of firm performance (profit margin, earnings persistence, asset turnover) across firm life cycle stages. She compares earnings persistence by life cycle stage and the convergence of profitability and finds that return on net operating assets does not uniformly mean revert when examined by life cycle stage. Additionally, she finds the impact of asset turnover and profit margin on firm profitability is conditional on life cycle stage.

Life cycle studies cross many disciplines. A number of studies examine strategy (Miller and Friesen 1984; Jawahar and McLaughlin 2001), governance (Ramaswamy et al. 2007; Chiang et al. 2011), incentives (Liao 2008), discretionary accruals (Liu 2008), research and development and capital expenditures (Ahmed and Jinan 2011), and firm payout policy (Coulton and Ruddock 2011) across life cycle stages.

Firm Life Cycle and Book-Tax Differences

Appendix B summarizes firm characteristics of the life cycle phases as documented in prior literature.[6] Firms in the introductory and growth phases of a

[6] See Appendix C for calculation of two measures of life cycle from the literature.

life cycle are characterized by investment in capital expenditures, acquisition of subsidiaries, and a focus on sales growth (Spence 1979; Jenkins et al. 2004). On the other hand, mature firms often focus on efficiencies and are characterized by steady state earnings (Black 1998). Finally, firms in the shake-out and decline phases dispose of assets (Dickinson 2011), focus on cost minimization (Jenkins et al. 2004) and likely have accrued losses from discontinued operations or restructuring charges. Anticipating that firms in different phases of life cycle engage in fundamentally different economic transactions and that these transactions have different book and tax treatments, I build on these differences and examine BTD across life cycle stages.

In considering anticipated firm behavior across life cycle stages, I focus on temporary book-tax differences. Poterba et al. (2011) examine firm tax footnotes in detail and tabulate sources of deferred tax assets and liabilities. They find that temporary differences related to property and equipment are the largest source of deferred tax liabilities. I expect, however, different patterns of acquisition and disposal of assets across life cycle stages. These distinct patterns should then lead to predictable differences in BTD. For example, the addition of property and equipment will generate BTD from the use of accelerated depreciation for tax purposes but not for book purposes, thus book income is greater than taxable income so the BTD is positive. Thus, introduction and growth firms are expected to have increasing BTD.

Introduction and growth firms are characterized by increasing operations, large positive accruals (Liu 2008), sales growth (Black 1998), high capital

expenditures (Black 1998), and high overall levels of investment (Spence 1979). In general, these transactions are associated with deferral of income for tax purposes. As documented by Poterba et al. (2011), the largest of these deferrals results from capital expenditures creating deferred tax liabilities. This results in book income greater than taxable income, generating a positive BTD. Taking the underlying economic transactions unique to the introduction and growth stages together leads to the creation of positive BTD.

As firms mature, they are characterized by a lower level of investment and innovation (Aharony et al. 2006, Chiang et al. 2011), lower levels of sales growth, and more persistent net income (Black 1998). Where firms in a growth stage have significant increases in investment and firms in shake-out or decline stages liquidate assets, mature firms replace assets as needed, generating smaller differences between book and taxable income. The tax effects of the firms' anticipated strategy and income in mature firms are expected to be relatively constant. Likewise, mature firms are more stable, and likely invest in tax planning. Given the anticipated positive BTD in the growth period, I expect firms will also have positive BTD in the maturity phase.

Shake-out or decline firms are characterized by changes in strategy designed to revitalize the firm. These firms reduce investment, and in some cases, dispose of assets to generate cash flows (Dickinson 2011). The disposition of property and equipment with tax accumulated depreciation in excess of book accumulated depreciation results in a negative BTD. Decline firms have large negative accruals as the volume of transactions decreases and reserves are

reduced (Liu 2008). Low profitability, combined with reversal of previously deferred taxable income will result in taxable income increasing and book income decreasing. In sum, as a result of the nature of transactions in these phases, shake-out and decline firms are expected to have negative BTD.

Given the fundamental differences among the economic transactions in life cycle phases, I expect a non-linear relation between BTD and firm life cycle. I thus hypothesize:

> *H1a: During the introduction and growth phases of a firm's life cycle, the difference between pre-tax book income and estimated taxable income is larger than during the mature phase (positive BTD).*

> *H1b: During the shake-out and decline phases of a firm's life cycle, the difference between pre-tax book income and estimated taxable income will be smaller than during the mature phase (negative BTD).*

Life Cycle, Book-Tax Differences and Earnings Persistence

Dickinson (2011) uses earnings persistence as a means to validate the cash flow components life cycle classification. She hypothesizes and finds that the mature stage is most associated with earnings persistence. Relative to the mature phase, she finds that all other stages are negatively related to future changes in profitability. Her findings are consistent with the life cycle and value relevance literature.

Jenkins et al. (2004) create a link between a firm's focus and strategy and the value relevance placed by investors on earnings components. They highlight that firms focus on different strategic actions in growth, maturity, and stagnant phases. In a growth phase firms are focused on changes in sales, and the authors document that the value relevance of a change in sales is relatively greater than other stages. However, as firms mature, the firm focus changes from growth in sales to growth in profitability, and value relevance of changes in profitability increase relative to sales growth. Similarly, the authors document that, stagnant firms, by necessity, focus on increases in profitability, which is reflected in the value relevance of changes in profitability.

Thus, in considering the earnings persistence for introduction and growth firms, I rely on the link created by Jenkins et al. (2004) between firm strategy and market valuation. Market participants evaluate firms based on reliable predictors of future earnings. Value relevance studies identify sales (Black 1998) and cash flows (Aharony et al. 2006) as more value relevant than bottom line profitability in the growth stage. Thus, if growth firms are focused on factors other than profitability, and if market participants place less value on current earnings as a predictor of future earnings, then it follows that earnings persistence would be lower for introduction and growth firms.

In contrast, mature firms are focused on cost minimization (Jenkins et al. 2004) and profitability (Black 1998). Further, during the mature phase, earnings are more value relevant than in the growth phase (Black 1998). Dickinson (2011) finds that mature firms have the highest levels of after-tax earnings persistence.

Unlike mature and growth firms, firms in a shake-out or decline phase are focused on recovery or survival. They often look for efficiencies and cost minimization strategies and restructure operations (Jenkins et al. 2004). Declining firms face low profit margins, low earnings (Miller and Friesen 1984; Black 1998), and investors again focus on cash flows as a signal of future profitability (Black 1998).

If, as suggested above, earnings persistence varies across both life cycle stage and BTD, and BTD are associated with life cycle, I contend that the observed relation between BTD and earnings persistence is driven, at least in part, by life cycle stage. Stated otherwise, the reason BTD are informative about future earnings is that BTD capture, to some extent, firm life cycle. If BTD vary predictably across life cycle stage, and both BTD and life cycle stage are associated with earnings persistence, I hypothesize:

H2: Controlling for firm life cycle stage will weaken the relation between large positive and large negative book-tax differences and lower earnings persistence.

Chapter 3

SAMPLE SELECTION

I begin with a sample of firm-years from 1994-2010 in the intersection of CRSP and COMPUSTAT that are incorporated in the U.S., excluding financial institutions and utilities.[7] I incorporate the same screens as Hanlon (2005), described below. My study begins after the implementation of SFAS 109 *Accounting for Income Taxes* in 1993 to ensure consistent accounting for temporary book-tax differences across my sample time period. I require firms to have all regression variables, and, consistent with Hanlon (2005) and Blaylock et al. (2012), I exclude firms-year observations with negative pre-tax income, reported net operating loss, or negative current tax expense, as the measure of BTD has different meaning for these firms. As discussed in Hanlon (2005), tax losses result in deferred tax assets, that "obscure the effects of 'true' book-tax differences in the deferred tax expense account" (page 144). My final sample consists of 24,394 firm-year observations consisting of 5,071 unique firms.

[7] Similar to other tax studies, I exclude financial institutions and utilities (SIC codes 4900-4999 and 6000-6999) because firms in regulated industries face a fundamentally different set of tax/non-tax trade-offs.

Chapter 4

RESEARCH DESIGN AND METHODOLOGY

Life Cycle Measures

To capture firm life cycle I follow Dickinson (2011) and form a measure of a firm's life cycle using cash flow patterns from operations, investing and financing activities. The cash flow model builds on the combination of the sign of each of the three components of the cash flow statement to categorize firms into one of five life cycle stages: introduction, growth, maturity, shake-out, and decline. For example, growth firms are associated with *positive* cash flows from operations, *negative* cash flows from investing activities, and *positive* cash flows from financing activities. Similarly, decline firms are associated with *negative* cash flows from operations and *positive* cash flows from investing activities. The table below outlines the life cycle stages developed using signs of cash flow components.

	Intro-duction	Growth	Mature	Shake-out			Decline	
Cash flows from operating activities	-	+	+	-	+	+	-	-
Cash flows from investing activities	-	-	-	-	+	+	+	+
Cash flows from financing activities	+	+	-	-	+	-	+	-

Other measures of life cycle are discussed in the robustness section of Section V below. The cash flow model of life cycle stages has several advantages over other life cycle measures in that it includes information readily available to investors, does not involve any comparisons across multiple periods, involves less subjectivity or relativity to other firms and offers a simple proxy for life cycle. In my analysis, I find that a number of firms achieve and maintain "maturity" status. Others grow, mature, and then decline. Still others mature then re-enter the growth stage. The life cycle models allow forward or backward progression across life cycle stages.

Models:

To test my first hypothesis, whether BTD vary across firm life cycle stages, I construct a measure of temporary BTD consistent with Hanlon (2005) as follows:

$$BTD_t = \frac{Federal\ Deferred\ Tax\ Expense_t + Foreign\ Deferred\ Tax\ Expense_t}{Statutory\ Tax\ Rate_t}^{8} \qquad (1)$$

I scale *BTD* by average assets to enable comparability across firms. I use t-tests to examine whether the means vary across life cycle groups.

In order to test my hypothesis that earnings persistence varies across firm life cycle stages, I follow Hanlon (2005) and construct a model of the persistence of pre-tax earnings using the following equation:

[8] The maximum statutory tax rate used in this calculation is the maximum corporate rate of 35%. The progressivity of the IRS corporate tax rate means that firms reporting taxable income less than $335,000 are subject to a lower rate. In untabulated tests, I exclude firms with taxable income less than $335,000 to ensure this calculation does not affect my determination of *BTD*. The inferences from my results remain unchanged.

$$PTBI_{t+1} = \alpha_0 + \alpha_1 PTBI_t + \varepsilon_{t+1} \quad (2)$$

where *PTBI* is pre-tax book income. Similar to Hanlon (2005), I use pre-tax earnings to test persistence because my variables of interest involve tax expense and thus affect after-tax earnings.

The finding in Hanlon (2005) that large BTD are associated with less persistent earnings are essential to my second hypothesis that links BTD, life cycle and earnings persistence. Thus, I replicate the model in Hanlon (2005) as follows:

$$PTBI_{t+1} = \gamma_0 + \gamma_1 LNBTD_t + \gamma_2 LPBTD_t + \gamma_3 PTBI_t + \gamma_4 LNBTD_t * PTBI_t + \gamma_5 LPBTD_t * PTBI_t + \varepsilon_{t+1} \quad (3)$$

where *LNBTD* is an indicator set equal to 1 if a firm-year observation is in the lowest quintile of scaled *BTD*, and *LPBTD* is an indicator set equal to 1 if a firm-year is in the highest quintile of scaled *BTD*, and zero otherwise. Consistent with Hanlon's findings, I expect γ_4 and γ_5 to be negative.

In order to test my main hypothesis, whether the relation between BTD and future earnings identified in previous studies is explained by firm life cycle stage, I begin by constructing the following model that enables me to compare coefficients on *LNBTD*PTBI* and *LPBTD*PTBI* between Equation (3) and the model incorporating life cycle:

$$PTBI_{t+1} = \delta_0 + \delta_1 LNBTD_t + \delta_2 LPBTD_t + \delta_3 PTBI_t + \delta_4 LNBTD_t * PTBI_t + \delta_5 LPBTD_t * PTBI_t + \sum_{k=1,2,4,5} \delta_k LC_t + \sum_{j=1,2,4,5} \delta_j LC_t * PTBI_t + \varepsilon_{t+1} \quad (4)$$

where variables are as defined above. For ease of interpretation, LC_t is a series of indicator variables set to 1 if a firm-year observation is in a particular life cycle

category, 0 otherwise. I use life cycle categories: 1 = introduction, 2 = growth, 4 = shake-out and 5 = decline, omitting 3 = mature. Thus, the intercept and δ_3 capture the persistence of mature firm-years. To test H2, I compare coefficients between Equations (3) and (4). If *LNBTD* and *LPBTD* fully capture life cycle, I anticipate the coefficients on δ_4 and δ_5 to be insignificant. Alternatively, if some portion of BTD is explained by life cycle, I anticipate that the coefficients δ_4 and δ_5 will be smaller than $\boldsymbol{\gamma}_4$ and $\boldsymbol{\gamma}_5$ in Equation (3) above.

To test H2, in untabulated results, I also construct a model similar to Equation (3) above, fully interacting all variables with all life cycle stages. However, the results of three-way interactions are often difficult to interpret. Similar results are obtained by regressing Equation (3) above on partitions by life cycle stage, although the coefficient estimates are inherently less precise because the partitions have fewer observations than the complete sample.

Chapter 5

RESULTS

Descriptive Analysis of Sample

Panel A of Table 1 presents descriptive statistics for the full sample of observations. Panel B presents the means of the variables partitioned into life cycle stages. I use t-tests to compare significance across life cycle stages. The means by life cycle stage indicate that pre-tax earnings (*PTBI*) are increasing from the introduction to the growth and maturity phases, then decreasing in the shake-out and decline phases. A similar trend is apparent for size, pre-tax cash flows (*PTCF*), and sales, confirming that the cash flow life cycle measure captures some features of firm life cycle. Of relevance to this study are the measures of BTD (unscaled) and BTD scaled by average assets. Consistent with expectations, the means document positive BTD in the introduction, growth and maturity phases, and negative in the shake-out phase.[9] Additionally, I find that mature firms are generally older than growth firms. While not the subject of my study, I include *TOTAL BTD*, which measures the total difference between book and taxable income and *PERM BTD* which measures permanent book tax differences (Hanlon et al. 2012). As discussed above, life cycle theory does not intuitively map into the types of transactions that give rise to permanent BTD, and thus these differences are not the focus of my study. Consistent with expectations, *PERM BTD* and *TOTAL BTD*, unlike temporary BTD, do not vary significantly or predictably across life cycle stages.

[9] The BTD average in the decline sample may be an indication of some survival bias; firms that reach a decline phase yet continue at least one year have increasing BTD as they recover.

Panel C examines the same sample partitioned across BTD groups, where *LNBTD* (*LPBTD*) represents the group of firm-years with scaled BTD in the bottom (top) quintile of annual observations. The remainder of firms are classified as Small BTD, consistent with the groupings in Hanlon (2005). Differences between groups are compared using t-tests Again, the trends across groups are predictable, and appear to support the notion that there is a relation between firm life cycle and BTD. Overall, Table 1 provides preliminary evidence in support of my hypotheses that BTD are associated with firm life cycle. Consistent with expectations, firm-years classified as introduction and growth (shake-out) are associated with higher (lower) levels of BTD, in support of H1a and H1b.

It is worth noting some unusual results in the introduction and decline phases. Recall that the life cycle stage is assigned to each firm year based on a combination of the signs of the components of cash flow statements, and that by necessity of the BTD variables; I require positive pre-tax income and positive tax expense. Thus, I lose a portion of firms because of data screens, especially within the introduction and decline phases. The observations that remain in the sample are those with current year income. Thus, the means for the decline and introduction groups should be interpreted with caution as the results are likely not representative of *all* introduction or decline firms.

INSERT TABLE 1 HERE

Hypothesis Testing

In order to test my main hypothesis that the documented relation between

earnings persistence and BTD is explained at least in part by life cycle, I first replicate the findings in Hanlon (2005) within my sample period. Table 2 column A presents the main test from Hanlon (2005) as modeled in Equation (3), confirming that large positive and large negative BTD are associated with lower earnings persistence.

Hypothesis 2 builds on the results documented above, and suggests that the association between firm-years with large positive and large negative BTD and lower levels of earnings persistence will weaken when controlling for firm life cycle. In Table 2 column B, I examine the results from estimating Equation (4) including controls for firm life cycle. The comparison of coefficients on *LPBTD*PTBI* and *LNBTD*PTBI* between columns A and B are used to test H2. Recall from Hanlon (2005) and column A that the coefficients on those interaction terms are significant and negative, indicating an association between large positive and large negative BTD and lower earnings persistence.

Including controls for life cycle, I find that the relation between *LPBTD* and earnings persistence is no longer significant, signaling that life cycle explains the relation between large positive BTD and earnings persistence. However, the coefficient on the interaction with *LNBTD* remains significant, suggesting that large negative BTD are still associated with earnings persistence after controlling for life cycle. I investigate these relationships further below by examining the sample partitioned on life cycle stage.

INSERT TABLE 2 HERE

To further test the relation between life cycle stages, large book-tax

differences, and earnings persistence, in Table 3, I present Hanlon's original BTD-persistence model [Equation (3)] regressed on the sample partitioned by life cycle stage. If life cycle explains the less persistent earnings associated with large BTD found in Hanlon (2005), I expect that partitioning the sample by life cycle will result in insignificant coefficients across life cycle stages. I note that the coefficients on the interaction terms vary across life cycle stages. The coefficients on the LNBTD and LPBTD interaction terms in the growth and shake-out phases are insignificant, indicating that within these phases large negative and large positive BTD are not associated with lower earnings persistence. This is consistent with the theory that growth and shake-out phases are associated with positive and negative BTD, respectively. In the introduction and decline phases, the LNBTD interaction terms are not significant, which follows if these phases are associated with lower earnings persistence. Similarly, the significant and positive coefficient on the LPBTD interaction term is consistent with firms engaging in acquisitions to grow.

I focus on the mature stage, in which the interaction between *LPBTD* and *PTBI* indicates lower persistence of earnings. I test this relation by examining the life cycle stage assignment for mature firms in year t+1. My prediction is that firms with LPBTD are moving into a growth phase of the life cycle, as the transactions giving rise to LPBTD are associated with growth. Thus, a firm classified as mature with LPBTD would likely exhibit lower persistent earnings, as life cycle theory predicts growing firms are focused on sales growth rather than profitability. Comparing the distribution of life cycle stage assignments in t+1

between the mature firms with LPBTD and all other mature firms, I find the LPBTD-mature firms exhibit significantly higher portion of observations in the growth phases in t+1 than the other mature firms, and a smaller portion of firms in the shake-out and decline phases.[10] I interpret this as a signal that *LPBTD* indicates not only lower persistence of earnings but also a change in firm characteristics as captured by life cycle. I interpret the results in Table 3 as supporting H2 and documenting that the relation between *LNBTD* and *LPBTD* and earnings persistence is related to firm life cycle. Similar to the results in Table 2, I find that life cycle impacts the relation between BTD and earnings persistence. Because of the concern that partitioning the sample reduces the power of the tests, I also test a model similar to Equation (4) above, but include all variables interacted with firm life cycle stage. Results from this fully interacted model are qualitatively similar to the results presented in Tables 2 and 3. Taken together, the results suggest that one reason book-tax differences are informative about earnings persistence is that BTD captures life cycle phase.

INSERT TABLE 3 HERE

Supplemental Analysis

Earnings Management and Tax Avoidance

Blaylock et al. (2012) conduct a similar analysis to investigate the results of Hanlon (2005) within the large positive BTD group (LPBTD). Their analysis suggests that the lower earning persistence identified *within* the LPBTD group is

[10] I compare mature firms in period t to their life cycle phase assignment in t+1. I use a non-parametric test, the Kruskal-Wallis, test to analyze the distribution of firms in period t+1.

driven by firm-years with high levels of discretionary accruals, an indication of possible earnings management. Both Kothari et al. (2005) and Liu (2008) provide evidence that growth affects the interpretation of discretionary accrual measures. Blaylock et al. (2012) construct a model of earnings persistence and interact current earnings with earnings management and tax planning measures. Their tests are designed to capture whether the large BTD is likely a result of earnings management or tax planning. They find lower earnings persistence for firms identified as engaging in earnings management within the large positive BTD group, but find tax planning has no effect on the persistence of pre-tax earnings.

In Table 4 I test whether life cycle can also explain some of the negative association between earnings management and earnings persistence identified in Blaylock et al. (2012). I construct a model similar to that in Blaylock et al. (2012), where *EM* is an indicator equal to 1 for firm-year observations with modified Jones Model discretionary accruals in the top quintile of firm-years in the sample. *TAXAVOID* is an indicator variable set to 1 if the firm's five year cash ETR is in the lowest quintile of firm-years in the sample. In Table 4 I consider the findings documented in Blaylock et al. (2012) controlling for the effect of life cycle on earnings persistence. Similar to my other tests, I find that within the LPBTD group, controlling for life cycle affects the coefficient on *EM*PTBI* (the persistence of earnings for firm-years associated with earnings management). It is worth noting the large positive coefficient on *PTBI*Shake-out*. Recall that for this test I use a subsample of firms identified as large positive BTD only, which I contend is related to growth. BTD signals contrary to expectation (i.e. large

positive BTD in the shake-out phase) may signal a change in strategy and a shift from shake-out to growth or maturity. Thus, the coefficient on *PTBI*Shake-out* indicates that firms in shake-out with large positive BTD exhibit significant persistence of earnings in the next period. Similar to my tests of H2, I examine the distribution of observations across life cycle phases in period t+1. I find that within the LPBTD sub-sample, the growth and shake-out firms in period t are associated with a higher portion of growth and maturity life cycle phase observations in the distribution of life cycle phases in period t+1.

Including life cycle in the model affects the interpretation of the results in Blaylock et al. (2012). I also test the distribution of *EM* and *TAXAVOID* observations across life cycle stages and find both measures have significantly higher portion of introduction and growth phase observations. Further analysis using the measures in Blaylock et al. and life cycle together may help highlight firms for which earnings management creates large positive BTD.

INSERT TABLE 4 HERE

Time Series Analysis

Life cycle theory and the models used in the literature allow for firms to progress forward and backward across life cycle stages as they grow, mature, decline and possibly invest to return to growth. Thus, I also test a sample of firms that I can identify with distinct phases of growth, maturity and decline in succession. I allow any firm that progresses across the phases for any length of time in each phase. The results are consistent with those noted above. Figure 1

presents a graph of BTD and earning persistence across the growth, mature and shake-out phases of the cash flow life cycle model. Similar to my analysis above, I find that BTD are highest in the growth phase and lowest in the shake-out phase. I also find the highest level of earnings persistence in the mature phase, consistent with the results of my cross-sectional tests.

INSERT FIGURE 1 HERE

Guenther (2011) Analysis

Lastly, as noted above, Guenther (2011) examines the results in Hanlon (2005) by examining "influential observations" that appear to be driving her findings. Using "data snooping" Guenther identifies 113 observations driving the relation between BTD and lower earnings persistence in Hanlon's study and identifies the characteristics of those observations.[11] He documents that Hanlon's results do not hold once controls are added for those factors such as high levels of special items, gains and losses, etc. In untabulated results, I eliminate Guenther's "influential" observations from my sample and find that Hanlon's results still hold in my sample period; firm years with large positive and large negative BTD are associated with less persistent earnings. In Table 5, I examine the relation among the Guenther's variables and identify where his measures vary significantly vary across life cycle stages.[12] I find that most of the characteristics he identifies of the

[11] Additionally, Guenther finds coding errors where the COMPUSTAT code for tax loss carryforwards (TLCF) was not populated, but the firm reported an NOL carryforward on their financial statements. Thus, the deferred tax expense (and the BTD) included the effect of the NOL, which is not truly a "book-tax difference." To mitigate concerns for miscoding of NOL data, I re-estimate all models after eliminating any firm-year observation with an NOL, pre-tax loss or negative tax expense in the *prior* year, based on screens from Mills et al. (2003). My results remain unchanged.

[12] I use t-tests to compare differences in means across the growth, maturity and shake-out phases.

firms driving the less persistent earnings in Hanlon (2005) vary significantly across life cycle stages. The results in Table 5 indicate that Guenther's findings capture some measure of life cycle.

INSERT TABLE 5 HERE

Robustness

In my tests above, I use one measure of life cycle, based on the cash flow model presented in Dickinson (2011). Anthony and Ramesh (1992), construct another life cycle model that incorporates a firm's five year history of four characteristics: age, sales growth, dividend yield, and capital expenditures.[13] Under their methodology, each year firms are assigned scores based on their relative ranking of these four characteristics. The scores for each of the four characteristics are then combined into a composite score so that each firm-year observation can be categorized into one of the following life cycle stages: growth, growth/maturity, maturity, maturity/stagnant, and stagnant phases of life cycle. See Appendix C for additional details of the calculation of the Anthony and Ramesh (1992) life cycle stages. The Anthony and Ramesh and Dickinson life cycle measures are somewhat correlated ($\rho = 0.26$, $p < 0.0001$), but do not overlap perfectly, and thus I interpret them as capturing different aspects of a firm's life cycle.

In untabulated results, I test the above models using the Anthony and Ramesh (1992) model of life cycle, and obtain qualitatively similar results. Again,

[13] By construction, requiring a five year history of these variables removes true "introduction stage" firms from the sample. However, due to the uncertainty involved in this stage, most studies do not focus on the introduction stage (Black 1992).

most variables demonstrate the anticipated trend across life cycle groups. The two methodologies capture different facets of firm life cycle and thus, I anticipate different results from the analysis.

It is possible that my results are driven by only one component of the aggregate life cycle measure, so I also consider the disaggregated components of the Anthony and Ramesh (1992) measure. I test a ranking of firm-years based on sales growth, or capital expenditures, or firm age. None of these measures alone captures the same effect as the Anthony and Ramesh composite model. My findings suggest that the aggregate measure employed by Anthony and Ramesh is more powerful than its individual components in capturing the life cycle stage of the firm.

Likewise, I also construct measures based on the three separate components of cash flows that comprise the life cycle classification above to examine whether the results from the cash flow measure are dependent on one component, operating, investing or financing. Again, I find this disaggregated measure does not yield informative results, and I conclude that the aggregate life cycle measure captures more than any one component alone. Because the descriptive statistics in Table 1 indicate size varies significantly and predictably across life cycle stages, I also test whether ranking firms based on size impacts my results. I find that size significantly impacts earnings persistence, but does not significantly impact the BTD-persistence tested in Equation (3). Lastly, to verify my results are not a result of partitioning my sample, I also assign firms to life cycle stages randomly and find the results do not support my hypotheses.

The BTD literature identifies that BTD are associated with, among other things, IRS audit adjustments (Mills 1998), audit fees (Hanlon et al. 2012), earnings growth (Lev and Nissim 2004), analyst forecast error (Weber 2009), credit ratings (Ayers et al. 2010), and market uncertainty (Comprix et al. 2011). These results suggest that BTD are an indication of risk to various stakeholders. To ensure my results are not simply capturing risk, I also compare common measures of risk (e.g., standard deviation of ROA, standard deviation of cash flows, standard deviation of returns, standard deviation of EBIT, and beta) across life cycle stages. In untabulated results, I find that all measures such as standard deviations of cash flows and standard deviation of ROA vary significantly across life cycle stages. However, inclusion of risk controls in place of life cycle in the above models does not affect the BTD-persistence relation. Additionally, I form portfolios based on quintile rankings of annual beta and find that within risk quintile, the relation between large BTD and persistence remains negative, but that inclusion of control for firm life cycle subsumes the relation. From these tests, I conclude that life cycle captures a different construct than risk alone.

A different stream of literature focuses on industry life cycle. These studies examine the number and nature of firms entering or exiting the marketplace, the nature of the products and the manufacturing processes, the volume of transactions and the relation between supply and demand (See, for example, Klepper 1997). While the measures designed to capture firm life cycle are different than those for industry life cycle, in untabulated results I compare distribution of firm life cycle stages across industries. The results indicate that

while there is some variation in distribution between industries, there is not a clustering that would affect the results of my analysis.

Chapter 6

CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH

The purpose of my study is to examine whether the negative relation between BTD and earnings persistence documented in prior literature can be explained in part by life cycle theory. To examine this hypothesis, I first document a relation between BTD and firm life cycle. Anticipating that firms in different phases of life cycle engage in fundamentally different economic transactions and that these transactions have different treatment for book and tax reporting, I document that the stage of a firm's life cycle is associated with its level of temporary BTD.

Prior literature documents that earnings persistence varies across both firm life cycle stage and BTD. Having established a relation between BTD and firm life cycle, I then examine whether life cycle provides an economic framework in which to consider the BTD-persistence relation. I find that in the case of large positive BTD, which is often identified as a signal of low earnings quality or earnings management, life cycle captures the relation between BTD and earnings persistence, suggesting that the relation between BTD and earnings management is more complex and requires additional examination.

My results also show that the relation between BTD and earnings persistence varies *within* life cycle stages. This also supports the notion that that firm life cycle at least partially explains the relation between BTD and earnings persistence. I find that mature firms with large positive BTD are associated with a shift to the growth phase in the subsequent period. This suggests that firm-years

with BTD contrary to magnitude and sign predicted by life cycle are early predictors of changes to future firm characteristics as captured by life cycle.

My results expand the findings in Blaylock et al. (2012) and Guenther (2011). Both studies, similar to this one, seek to examine the results in Hanlon (2005) more closely. My study further supports the findings in Guenther (2011) by offering a life cycle explanation for why the influential observations he identifies impact the BTD-persistence relation. I also offer firm life cycle as an alternative explanation for the results in Blaylock et al. (2012), who document that the lower earnings persistence associated with LPBTD are driven by earnings management.

Lastly, my study provides an alternate explanation for why some firms appear to avoid more taxes than others. If BTD vary by life cycle, it may be interesting to consider the findings in other tax studies that examine the characteristics of firms that appear to avoid income taxes. The results of my study suggest considering the information in BTD and tax avoidance measures in a life cycle framework may enhance our understanding of firm behavior. Overall, my study provides an economic framework in which to consider BTD in general, and specifically in relation to the BTD-earnings persistence literature.

The results of this study give rise to future research questions regarding how market participants incorporate life cycle and book-tax differences into their expectations. Life cycle theory predicts that market participants have different expectations and react differently to firm performance over the phases of the life cycle. Given firm characteristics, both innate and those included in the

construction of the life cycle measures, I expect that the differing market expectations across firm life cycle will extend to BTD. The life cycle literature has documented that investors value earnings, sales, cash flows and accruals differently across life cycle stages. It is possible that investors' reaction to BTD observed in prior literature is a function of their understanding of firm life cycle, or the combination of life cycle and BTD.

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APPENDIX A

BOOK-TAX DIFFERENCES

Book-tax Differences		Source of Positive BTD (PBTD)[14]	Source of Negative BTD (NBTD)
Property, plant & equipment	In general, GAAP requires depreciating assets over the estimated useful life. Tax rules allow for accelerated depreciation over established lives	Tax depreciation expense > book depreciation expense (young assets and/or increasing acquisitions)	Book depreciation expense > tax depreciation expense (aged assets not being replaced) Tax gain > book gain (disposing of assets with excess tax accumulated depreciation over book depreciation)
Revenues	In general, GAAP requires recognizing revenues when earned, tax requires recognition when received.	Installment sale revenue recognized at transaction date, revenues not recognized for tax purposes until received. Subsequent recognition for GAAP of revenues received but not earned, recognized for tax purposes upon receipt.	Subsequent receipt of installment sale revenues recognized for tax purposes, previously recognized for GAAP. Revenues received in advance recognized for tax purposes when received (i.e. subscription revenues), recognized when earned for GAAP.
Inventory	In general, GAAP requires matching of costs of inventory with sales revenue. IRS rules require capitalization of additional indirect costs ("UNICAP"). Firms may use different cost flow methods under both reporting systems.	Current year increase in tax inventory > current year increase in book inventory Inventory growth	Current year change in book inventory < change in tax inventory Inventory decline
Bad debts	GAAP requires estimating a reserve for uncollectable accounts to match revenues and expenses. Tax allows a deduction only once the account is written off.	Write off of bad debts > Allowance Increase (sales decreasing)	Allowance increase >write off of bad debts (sales increasing)
Warranty reserve	GAAP requires recording an estimate of future warranty expenses as a liability at the time of sale (matching). Tax allows a deduction of expenses only once they have been incurred.	Actual warranty expenditures > estimated warranty expense (sales decreasing, estimated warranty reserve decreasing)	Estimated warranty expense > actual warranty expenditures (sales increasing and/or estimated warranty increasing)
Goodwill	Goodwill from asset acquisition is amortized for tax purposes over a 15 year life. Goodwill for GAAP is tested annually for impairment and adjusted downward in the event impairment is identified.	Tax amortization expense>GAAP impairment	GAAP impairment > tax amortization

These BTD were selected from Poterba et al. (2011) and Raedy et al. (2011) who examine the information content of tax footnote disclosures and tabulate the temporary differences reported in the Schedule of Deferred Tax Positions of the Fortune 250 firms from 1993 through 2007.

[14] Spilker et al. (2010) refer to positive BTD as "favorable" and negative BTD as "unfavorable," referring to the impact on earnings reported for income tax purposes.

APPENDIX B

CHARACTERISTICS OF LIFE CYCLE PHASES AND EXPECTATIONS OF BOOK-TAX DIFFERENCES

Life cycle phase	Characteristics of phase	Book-tax differences Expectation	Persistence expectation

Introduction (Early Growth) (most studies ignore this phase as it is considered to be the time before going public)	• Operations/Strategy
	  ○ Little positive earnings or positive cash flows (Black 1998)
	• Investing
	  ○ Innovation (Miller and Friesen 1984)
	  ○ Few assets in place (Black 1998; Aharony et al. 2006)
	  ○ R&D investment (Black 1998)
	• Financing
	  ○ Stockholders demand returns greater than market for uncertainty (Mueller 1972)
	  ○ ESO granted (Bens et al. 2002)
	  ○ Cash constraint (Black 1998)
	  ○ Low dividends (Black 1998)
	  ○ Contributed capital/total equity high (DeAngelo et al. 2006)
	  ○ Reinvest profits and raise additional capital (Mueller 1972)
	• Valuation
	  ○ Value of the firm based on growth opportunities (Black 1998)
		Loss, NOLs
		
		Possible TI>NI, or NI>TI as move into growth phase.
			Variation in persistence (strong firms survive)
			
			Earnings less likely to persist because of changes in assets in place (Black 1998)

Growth (Late Growth)	• Operations/Strategy
	  ○ Firm complexity increases (Liao 2008)
	  ○ Increases in accounts receivable and inventory (Liu 2008)
	  ○ Large positive accruals (Liu 2008)
	  ○ Growth pursued at the expense of stockholder welfare (Mueller 1972)
	  ○ Growing organizational complexity (Mueller 1972)
	  ○ High sales growth (Black 1998)
	  ○ Product differentiation (Jenkins et al. 2004)
	  ○ Rapid growth and technological innovation (Chiang et al. 2011)
	  ○ Rapid and accelerating growth in sales (Spence 1979)
		NI > TI
		(LPBTD)
			Firms focus on sales more than profitability (Aharony et al. 2006; Black 1998)

	• Investing o Firm has many positive NPV projects available (Grullon and Michaely 2004) o Innovation (Miller and Friesen 1984) o High capital expenditures (Black 1998) o High levels of investment (Spence 1979) • Financing o Incentive based compensation plans (Liao 2008) o ESO issued/granted (Bens et al. 2002) o Low dividends (Black 1998) • Valuation o Cash flows more value relevant (Aharony et al. 2006) o Value of firm based on growth and growth opportunities more so than assets in place (Black 1998) o Earnings related to changes in assets in place (Black 1998) o Earnings less likely to persist (Black 1998) o Performance more informative for pricing than risk factors (Xu 2007)		
Maturity	• Operations/Strategy o Net income persists because of assets in place (Black 1998) o Profitability maximized (Black 1998; Dickinson 2011) o Cost minimization strategy (Jenkins et al. 2004) o Low growth (Black 1998) o Sales levels stabilize (Chiang et al. 2011) • Investing o Fewer investment opportunities leads to excess cash (Aharony et al.	NI > TI (PBTD) decreasing across phase As NI >TI decreases, move into shake-out/decline.	Earnings persistence expected to be highest in maturity (Dickinson 2011)

	2006; Yu and Jiang 2010) ○ Less new innovations (Chiang et al. 2011) ○ Depreciation may suffice to finance asset replacement and maintenance. (Aharony et al. 2006) • Financing ○ Excess cash leads to repurchases (Grullon and Michaely 2004; Yu and Jiang 2010) ○ Firms service debt and distribute cash to shareholders (Dickinson 2011) ○ High levels of retained earnings lead to increased dividends and share repurchases (Coulton and Ruddock 2011) • Valuation ○ Related diversification increases firm value, unrelated diversification erodes firm value (Shyu and Chen 2009) ○ Beta and leverage risk factors priced (Xu 2007) ○ Decrease in risk results from a decrease in cost of capital and a decrease in growth options (Grullon and Michaely 2004) ○ Value of firm based more on assets in place (Black 1998) ○ High levels of market value of equity and book value of equity (Black 1998)		
Shake-out/ revival (Early Decline)	• Operations/Strategy ○ Large firms with organizational complexity and inefficient information flow, leading to increased uncertainty and decreased profitability. (Mueller 1972) ○ Cost minimization and focus on operational efficiencies (Jenkins et al. 2004) ○ New management may be brought in and new markets and products explored (Ramaswamy et al. 2007)	Tax planning may be more important in this phase due to cash constraints Likely move from NI>TI to TI>NI As the relation between TI and NI changes, the information content of book-tax differences will change If TI>NI not true, decline may not persist.	Earnings expected to be less persistent for firms in decline. Anticipate variation in persistence (strong firms revert to growth/maturity, weak decline further)

	• Investing
	  ○ Declining innovations (Mueller 1972)
	  ○ Firms divest to remove less profitable operations, resulting in increased profitability and decreased debt levels (Pashley and Philippatos 1990)
	  ○ Firms can regenerate by investing in new technology (Black 1998)
	• Financing
	  ○ Increasing share of profits distributed to shareholders (Mueller 1972)
	  ○ Increased repurchases and dividends. (Coulton and Ruddock 2011)
	• Valuation
	  ○ Risk factors priced (Xu 2007)		

Decline
(Late Decline)
	• Operations/Strategy
	  ○ Inflexible firms recommit to prior strategy (Liao 2008)
	  ○ Inventory write down and write off of uncollectible receivables (Liu 2008)
	  ○ Large negative accruals (Liu 2008)
	  ○ Price cutting (Miller and Friesen 1984)
	  ○ Low earnings, low profit margins (Black 1998)
	• Investing
	  ○ Low levels of innovation (Miller and Friesen 1984)
	• Financing
	  ○ Low dividend payout (Black 1998)
	• Valuation
	  ○ Probability of liquidation high (Black 1998)
		TI > NI
		(LNBTD)
		
		Should indicate lack of persistence of earnings.
		
		If TI>NI not true, decline may not persist.
		
		Tax planning may be more important in this phase due to cash constraints
			Lowest level of persistence.

APPENDIX C

LIFE CYCLE MEASURES

1. Following Dickinson (2011)

Dickinson (2011) models life cycle stage based on the sign of the three components of the cash flow statement.

	Intro-duction	Growth	Mature	Shake-out			Decline	
Cash flows from operating activities	-	+	+	-	+	+	-	-
Cash flows from investing activities	-	-	-	-	+	+	+	+
Cash flows from financing activities	+	+	-	-	+	-	+	-

2. Following Anthony and Ramesh (1992)

Anthony and Ramesh use four classification variables

1. Dividend as a percentage of net income

$$DP_t = (DVC_t/IB_t) * 100$$

2. Percentage sales growth

$$SG_t = \left(\frac{SALES_t - SALES_{t-1}}{SALES_{t-1}}\right) * 100$$

3. Capital expenditure as a percentage of the total value of the firm[15]

$$CEV_t = \left(\frac{CE_t}{VALUE_t}\right) * 100$$

4. Age_t from founding dates from Jay Ritter website.[16]

$IBED_t$ = income before extraordinary items and discontinued operations in year t
$Sales_t$ = net sales in year t
CE_t = capital expenditures in year t (CAPX)
$VALUE_t$ = market value of equity plus book value of long-term debt at the end of year t (DLTT)

For each of firm-year, the median value of the prior five years is calculated for each of the financial variables.

For each variable, the median measure is ranked into low, medium and high based on the following table:

Life Cycle Stage (score)	DP	SG	CEV	AGE
Growth (1)	Low	High	High	Young
Mature (2)	Medium	Medium	Medium	Adult
Stagnant (3)	High	Low	Low	Old

[15] Anthony and Ramesh (1992) exclude CEV from their measure because for their time frame that variable is poorly populated. I include it in my calculations; however, excluding CEV does not impact the inferences of my results.
[16] bear.warrington.ufl.edu/ritter/foundingdates.htm

Each firm-year is then assigned a score based on each variable (e.g. low DP = 1, Old age = 3). Using a composite score, firm-year observations are assigned to five groups – Growth, Growth/Mature, Mature, Mature/Stagnant, and Stagnant.

APPENDIX D

TABLES AND FIGURES

TABLE 1
Descriptive Statistics for the Full Sample,
by Life Cycle Stage, and by BTD Classification

Panel A: Full Sample (n=24,394)

	Mean	Median	Std. Dev.
$PTBI_t$	0.129	0.105	0.120
$PTBI_{t+1}$	0.095	0.092	0.146
CAPEX	0.073	0.049	0.082
SIZE	5.702	5.602	1.946
PTCF	0.151	0.140	0.124
PTACC	-0.022	-0.033	0.114
CASH ETR	0.296	0.284	1.692
GAAP ETR	0.385	0.371	3.146
SALES	2519	319	11803
SALES GROWTH	31.601	0.118	3607.2
LEVERAGE	0.168	0.119	0.202
BTD (unscaled)	17.552	0.203	343.470
BTD†	2.553	2.379	88.176
PERM BTD (unscaled)	9.641	-0.547	456.990
PERM BTD†	27.475	-4.695	451.318
TOTAL BTD (unscaled)	27.193	0.183	525.914
TOTAL BTD†	30.028	2.101	452.299
ROA	0.129	0.106	0.120
DISCRETIONARY ACCRUALS	0.025	0.010	0.348
5 YR CASH ETR	0.281	0.303	0.211
AGE	17.595	13	14.277
BTM	0.783	0.465	33.079
DEBT/EQUITY	0.363	0.197	23.362

Panel B – Variable Means Partitioned by Life Cycle Phase as defined in Dickinson (2011)

	Intro-duction	Growth	Maturity	Shake-out	Decline	Diff 1-3	Diff 2-3	Diff 3-4	Diff 3-5
N	1,712	8,923	11,673	1,741	345				
% total n	7.02%	36.58%	47.85%	7.14%	1.41%				
$PTBI_t$	0.097	0.127	0.135	0.125	0.150	***	***	***	
$PTBI_{t+1}$	0.031	0.085	0.114	0.088	0.001	***	***	***	***
CAPEX	0.057	0.099	0.062	0.038	0.034	***	***	***	***
SIZE	4.637	5.688	5.933	5.485	4.620	***	***	***	***
PTCF	-0.043	0.153	0.187	0.132	-0.036	***	***	***	***
PTACC	0.141	-0.027	-0.052	-0.007	0.186	***	***	***	***
CASH ETR	0.371	0.257	0.297	0.353	0.589	*		**	**
GAAP ETR	0.399	0.383	0.394	0.351	0.244				
SALES	635	1841	3463	1856	799	***	***	***	***
SALES GROWTH	3.578	71.433	6.856	27.381	0.357				
LEVERAGE	0.175	0.183	0.162	0.133	0.147	***	***	***	
BTD (unscaled)	0.512	22.827	14.885	-7.356	13.800	***	***	***	
BTD†	-5.174	3.933	2.054	-0.316	21.602	***		**	*
PERM BTD (unscaled)	4.562	11.916	5.505	32.436	0.847			**	
PERM BTD†	58.289	34.564	18.366	14.409	62.982	***	**	***	*
TOTAL BTD(unscaled)	5.074	34.743	20.390	25.08	14.647	**			

Panel B (continued)– Variable Means Partitioned by Life Cycle Phase as defined in Dickinson (2011)

	Intro-duction	Growth	Maturity	Shake-out	Decline	Diff 1-3	Diff 2-3	Diff 3-4	Diff 3-5
TOTAL BTD†	53.115	38.497	20.420	14.093	84.584	***	**	*	*******
ROA	0.098	0.128	0.136	0.125	0.149	***	***	***	
DISCRETIONARY ACCRUALS	0.095	0.027	0.013	0.032	0.033	***	***	*	
5 YR CASH ETR	0.237	0.255	0.307	0.292	0.264	**	***	**	*******
AGE	10.442	14.384	20.799	19.697	17.136	***	***	***	
BTM	0.686	0.434	1.075	0.568	0.978				
DEBT/EQUITY	0.644	0.155	0.243	0.876	5.801	***			
% Large Negative BTD (LNBTD)	23%	21%	23%	25%	19%	**	***	***	*******
% Large Positive BTD (LPBTD)	14%	22%	20%	17%	21%	***	***	***	

Panel C – Variable Means Partitioned by Large Positive and Large Negative BTD

	Large Positive BTD (LPBTD)	Small BTD	Large Negative BTD (LNBTD)	Diff 1-2	Diff 2-3	Diff 1-3
N	4,862	14,661	4,871			
% total n	19.93%	60.10%	19.97%			
$PTBI_t$	0.142	0.117	0.150	***	***	***
$PTBI_{t+1}$	0.090	0.091	0.108		***	***
CAPEX	0.102	0.066	0.066	***	***	
SIZE	5.776	5.789	5.366		***	***
PTCF	0.162	0.140	0.176	***	***	***
PTACC	-0.020	-0.023	-0.026		**	
CASH ETR	0.183	0.327	0.313	***	***	
GAAP ETR	0.410	0.441	0.195		***	***
SALES	2224	2881	1725	***	***	***
SALES GROWTH	2.954	12.410	119.163			
LEVERAGE	0.200	0.172	0.125	***	***	***
BTD (unscaled)	112.274	15.632	-71.214	***	***	***
BTD†	65.033	3.047	-61.298	***	***	***
PERM BTD (unscaled)	-5.872	5.660	37.095		***	***
PERM BTD†	16.618	17.840	67.295		***	***
TOTAL BTD (unscaled)	106.402	21.292	-34.119	***	***	***

Panel C (continued) – Variable Means Partitioned by Large Positive and Large Negative BTD

	Large Positive BTD (LPBTD)	Small BTD	Large Negative BTD (LNBTD)	Diff 1-2	Diff 2-3	Diff 1-3
TOTAL BTD†	81.651	20.887	5.997	***	***	***
ROA	0.143	0.118	0.151	***	**	***
DISCRETIONARY ACCRUALS	0.028	0.021	0.038			***
5 YR CASH ETR	0.229	0.302	0.271	***	***	***
AGE	17.280	18.403	15.478	***	***	***
BTM	1.837	0.603	0.286			
DEBT/EQUITY	0.819	0.267	0.195			

Variable Definitions

LC	=	life cycle stage based on cash flow components as defined by Dickinson (2011), comprised of five indicator variables where 1= introduction, 2= growth, 3 = mature, 4 = shake-out, 5 = decline
$PTBI_t$	=	Pre-tax book income (PI) in year t, scaled by average assets
$PTBI_{t+1}$	=	Pre-tax book income (PI) in year t+1, scaled by average assets
CAPEX		Capital expenditures (CAPX) scaled by average assets
SIZE	=	natural log of assets
PTCF	=	Pre-tax cash flows (OANCF+TXPD-XIDOC) in year t, scaled by average assets
PTACC	=	Pre-tax accruals (PTBI-PTCF) in year t, scaled by average assets
CASH ETR	=	as defined by Dyreng et al. (2008) cash taxes paid divided by pre-tax income less special items TXPD/(PI-SPI)
GAAP ETR	=	as defined by Dyreng et al. (2008) tax expense divided by pre-tax income TXT/PI
SALES	=	total sales (SALE)
SALES GROWTH	=	change in sales = (sales t - sales t-1)/sales t-1
LEVERAGE	=	long-term debt scaled by total assets DLTT/AT
BTD (unscaled)	=	temporary differences between book and tax as defined in Hanlon (2005) as sum of federal and foreign deferred tax expense grossed up by the statutory tax rate (35%) = (TXDFO+TXDFED)/.35
BTD	=	BTD scaled by average assets
PERM BTD (unscaled)	=	as defined by Hanlon et al. (2012) TOTAL BTD less temporary differences.
PERM BTD	=	PERM BTD scaled by average assets
TOTAL BTD	=	as defined by Hanlon et al. (2012) Pre-tax income less the current tax expense grossed up by the statutory tax rate (35%) less the change in net operating losses carryforward. (PI-((TXT-TXDI)/0.35 – ΔTLCF)
TOTAL BTD (unscaled)	=	TOTAL BTD scaled by average assets
ROA	=	Net income scaled by average assets
DISCRETIONARY ACCRUALS	=	modified Jones model discretionary accruals
5 YR CASH ETR	=	as defined in Dyreng et al. (2008) = sum 5 years cash taxes paid / sum 5 years pre-tax income less special items
AGE	=	firm age calculated as current year less founding year from Jay Ritter web site (bear.warrington.ufl.edu/ritter/foundingdates.htm);
BTM	=	ratio of a firm's book value of equity to its market value of equity at time t (SEQ/(PRCC_F*CSHO)
DEBT/EQUITY	=	Ratio of long-term debt (DLTT) to equity (SEQ)
% LNBTD	=	% of the sample that is in the lowest quintile of annual scaled BTD
% LPBTD	=	% of the sample that is in the highest quintile of annual scaled BTD

All continuous variables are winsorized at 1% and 99%, † Multiplied by 1,000 for descriptive statistics, *, **, *** indicates significance at the 0.10, 0.05 and 0.01 levels, respectively, using a two-tailed test.

Table 2
Replication of Hanlon (2005) OLS Regression of Next Year's Pre-Tax Earnings on Current Pre-Tax Earnings, with Coefficients Varied by Large Positive and Large Negative BTD and with Coefficients Varied by Life Cycle Stage

$$PTBI_{t+1} = \gamma_0 + \gamma_1 LNBTD_t + \gamma_2 LPBTD_t + \gamma_3 PTBI_t + \gamma_4 LNBTD_t * PTBI_t + \gamma_5 LPBTD_t * PTBI_t + \varepsilon_{t+1} \quad (3)$$

$$PTBI_{t+1} = \delta_0 + \delta_1 LNBTD_t + \delta_2 LPBTD_t + \delta_3 PTBI_t + \delta_4 LNBTD_t * PTBI_t + \delta_5 LPBTD_t * PTBI_t + \sum_{k=1,2,4,5} \delta_k \, LC_t + \sum_{j=1,2,4,5} \delta_j \, LC_t * PTBI_t + \varepsilon_{t+1} \quad (4)$$

	Base Model				**With Life Cycle Controls**			
	Pred Sign	**Coeff**	**t-stat**		**Pred Sign**	**Coeff**	**t-stat**	
Intercept	+	0.056	5.43	**	+	0.068	5.73	***
LNBTD	-	0.031	1.80	**	-	0.030	1.83	*
LPBTD	-	0.021	1.22		-	0.001	0.07	
PTBI	+	0.616	11.33	***	+	0.614	8.29	***
PTBI*LNBTD	-	-0.226	-1.83	**	**?**	-0.286	-2.10	**
PTBI*LPBTD	-	-0.256	-1.96	**	**?**	-0.127	-0.83	
Introduction					-	-0.045	-3.55	***
Growth					-	-0.020	-1.60	*
Shake-out					-	-0.034	-1.18	
Decline					-	-0.023	-1.31	
PTBI * Introduction					-	-0.190	-1.73	*
PTBI * Growth					-	-0.014	-0.14	*
PTBI * Shake-out					-	0.113	0.45	**
PTBI * Decline					-	-0.643	-5.54	***
Industry and year Effects	Yes				Yes			
n	24,394				24,394			
R^2	18.81%				22.64%			

This table compares the results from estimating equation (3) and equation (4) on the same sample to analyze the effect of life cycle on the BTD-earnings persistence relation.

Variable definitions: *PTBI t* is pre-tax book income (PI) in year t, scaled by average assets; *LC* is firm life cycle stage as defined in Dickinson (2011),; *BTD* is an estimate of temporary differences between GAAP and taxable income defined as (TXDFO+TXDFED)/0.35;LPBTD is an indicator set equal to 1 for firm-year observations in the highest quintile of annual scaled BTD, 0 otherwise, LNBTD is an indicator set equal to 1 for firm-year observations in the highest quintile of annual scaled BTD, 0 otherwise.

Robust standard errors are reported, clustered by firm.
*, **, *** indicates significance at the 0.10, 0.05 and 0.01 levels, respectively, using a two-tailed test.

Table 3
OLS Regression of Next Year's Pre-Tax Earnings on Current Pre-Tax Earnings with Coefficients varied by Large Positive and Large Negative BTD Partitioned on Life Cycle Stage

$$PTBI_{t+1} = \gamma_0 + \gamma_1 LNBTD_t + \gamma_2 LPBTD_t + \gamma_3 PTBI_t + \gamma_4 LNBTD_t * PTBI_t + \gamma_5 LPBTD_t * PTBI_t + \varepsilon_{t+1} \quad (3)$$

		Stage 1 Introduction (n = 1,712)		Stage 2 Growth (n = 8,923)		Stage 3 Maturity (n = 11,673)		Stage 4 Shake-out (n = 1,741)		Stage 5 Decline (n = 345)	
	Coeff. (t-stat)										
Intercept		0.069	**	0.052	***	0.059	***	0.021		0.062	***
		(2.09)		(2.86)		(3.73)		(0.75)		(9.95)	
PTBI		0.470	***	0.503	***	0.692	***	0.597	***	0.085	
		(5.85)		(4.65)		(8.40)		(4.71)		(0.75)	
LNBTD		-0.001		-0.002		0.047	*	0.032		0.037	
		(-0.01)		(-0.19)		(1.68)		(1.28)		(1.03)	
LPBTD		0.012		-0.013		0.034	*	-0.160		-0.037	
		(0.58)		(-1.11)		(1.71)		(1.37)		(-0.81)	
PTBI* LNBTD		-0.016		-0.029		-0.315		-0.307		-0.301	*
		(-0.11)		(0.30)		(-1.58)		(1.48)		(1.69)	
PTBI* LPBTD		-0.436	***	0.021		-0.302	**	1.045		-0.218	*
		(-2.51)		(0.21)		(-2.03)		(1.16)		(1.86)	
Industry and year controls		Yes		Yes		Yes		Yes		Yes	
R^2		11.24%		17.51%		29.67%		33.09%		25.88%	

Regressions include industry and year fixed effects. Robust standard errors are reported, clustered by firm.
*, **, *** indicates significance at the 0.10, 0.05 and 0.01 levels, respectively, using a two-tailed test.
This table estimates equation (3) on the sample partitioned by life cycle stage as defined in Dickinson 2011.
Variable definitions: *PTBI t* is pre-tax book income (PI) in year t, scaled by average assets; *LC* is firm life cycle stage as defined in Dickinson (2011),; *BTD* is an estimate of temporary differences between GAAP and taxable income defined as (TXDFO+TXDFED)/0.35;LPBTD is an indicator set equal to 1 for firm-year observations in the highest quintile of annual scaled BTD, 0 otherwise, LNBTD is an indicator set equal to 1 for firm-year observations in the highest quintile of annual scaled BTD, 0 otherwise.

Table 4
OLS Regression of Future Pre-tax Earnings on Current Pre-Tax Earnings with Coefficients Varied by Life Cycle Stage and Earnings Management and Tax Avoider (Blaylock et al. 2012)

$$PTBI_{t+1} = \beta_0 + \beta_1 EM_t + \beta_2 TaxAvoid_t + \beta_3 PTBI_t + \beta_4 EM_t * PTBI_t + \beta_5 TaxAvoid_t * PTBI_t + \sum \beta_k LC_t + \sum \beta_j LC_t * PTBI_t + \varepsilon_{t+1}$$

	Blaylock et al. (2012) Model				Model with Life Cycle			
	Pred. Sign	**coeff**	**t-stat**		**Pred. Sign**	**coeff**	**t-stat**	
Intercept		0.075	3.87	***		0.090	4.07	***
EM	-	0.048	2.25	***	-	0.001	0.07	
TAXAVOID	-	-0.028	-0.48		-	-0.054	-1.79	*
PTBI	+	0.554	9.49	***	+	0.528	6.20	***
EM * PTBI	-	-0.451	-3.15	***	-	-0.060	-0.39	
TAX AVOID * PTBI	**?**	0.039	0.08		**?**	0.324	1.28	
Introduction					-	-0.003	-0.11	
Growth					-	-0.021	-1.46	
Shake-out					-	-0.177	-1.55	
Decline					-	-0.062	-1.22	
PTBI * Introduction					-	-0.179	-0.75	
PTBI * Growth					-	0.476	4.63	***
PTBI * Shake-out					-	1.60	1.90	*
PTBI * Decline					-	-0.211	-1.21	
Industry Effects		Yes				Yes		
Year Effects		Yes				Yes		
n		3,661				3,661		
R^2		13.41%				28.81%		

This table presents regression of the model from Blaylock (2012) excluding and including controls for firm life cycle stage on a sample of large positive BTD only (LPBTD).
Variable definitions: $PTBI_t$ is pre-tax book income (PI) in year t, scaled by average assets, *LC* is firm life cycle stage as defined in Dickinson (2011), *EM* is an indicator variable set equal to 1 for firm-year observations in the highest quintile of modified Jones Model discretionary accruals by year, 0 otherwise; *TAXAVOID* is an indicator set equal to 1 for firm –year observations in the lowest quintile of five year cash ETR as defined in Dyreng et al. (2008), 0 otherwise.
Robust standard errors are reported, clustered by firm.
*, **, *** indicates significance at the 0.10, 0.05 and 0.01 levels, respectively, using a two-tailed test.

Table 5
Comparison of Means across Life Cycle Stages of Influential Variables from Guenther (2011)

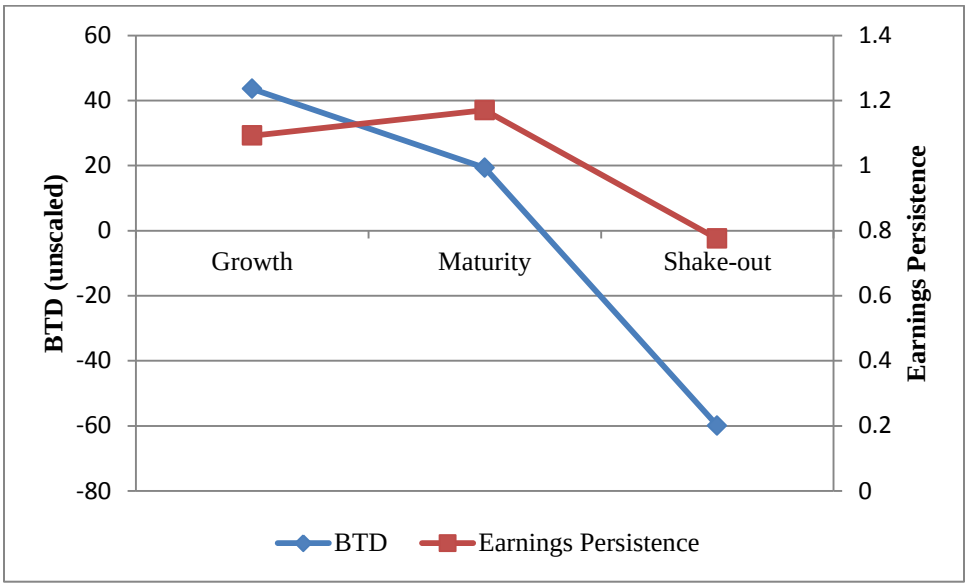
	STAGE 1 Introduction	STAGE 2 Growth	STAGE 3 Maturity	STAGE 4 Shake-out	STAGE 5 Decline	diff 2-3	diff 3-4	diff 2-4
	n = 1,712	n = 8,923	n = 11,673	n = 1,741	n = 345			
AGE	10.44	14.38	20.80	19.69	17.14	***	***	***
LO_SP	0.0152	0.0204	0.0127	0.0201	0.0232	***	-	-
HI_SP	0.0081	0.0072	0.0071	0.0465	0.1478	-	***	***
LO_NOP	0.0005	0.0004	0.0004	0.0011	0.0000	-	-	-
HI_NOP	0.0082	0.0032	0.0049	0.0178	0.1043	-	***	***
LO_GLIS	0.0017	0.0054	0.0117	0.0138	0.0029	***	-	***
HI_GLIS	0.0146	0.0314	0.0541	0.1080	0.0928	***	***	***
LO_GLCF	0.0088	0.0058	0.0039	0.0620	0.2145	-	***	***
HI_GLCF	0.0000	0.0003	0.0011	0.0017	0.0000	-	-	-
LO_DWC	0.0683	0.0020	0.0017	0.0011	0.0406	-	-	-
HI_DWC	0.0000	0.0003	0.0007	0.0011	0.0029	-	-	-
LO_DFO	0.0129	0.0068	0.0045	0.0092	0.0580	-	***	-
HI_DFO	0.0339	0.0455	0.0317	0.0460	0.0435	***	***	-
LO_DAL	0.4206	0.2578	0.2164	0.2843	0.4464	***	***	-
HI_DAL	0.1939	0.2611	0.2633	0.2590	0.2116	-	-	-
ROA	0.0982	0.1275	0.1359	0.1254	0.1498	***	***	***

This table compares means of the variables in Guenther (2011) across life cycle stages using t-tests across groups. *** indicate significance differences between groups at p > 0.0001 level

Variable Definitions (from Guenther (2011)):

AGE = firm age calculated as current year less founding year from Jay Ritter web site (bear.warrington.ufl.edu/ritter/foundingdates.htm); *SP*=special items scaled by average assets for year t (data17); *LO_SP*=1 if *SP* is less than -0.07 and 0 otherwise; *HI_SP*=1 if *SP* is greater than 0.07 and 0 otherwise; *NOP*=non-operating income scaled by average assets for year t; *LO_NOP*=1 if *NOP* is less than -0.1 and 0 otherwise; *HI_NOP*=1 if *NOP* is greater than 0.1 and 0 otherwise; *GLIS*=gain or loss from the income statement scaled by average assets for year t; *LO_GLIS*=1 if *GLIS* is less than 0 and 0 otherwise; *HI_GLIS*=1 if *GLIS* is greater than 0 and 0 otherwise; *GLCF*=gain or loss on the cash flow statement scaled by average assets for year t (data213); *LO_GLCF*=1 if *GLCF* is less than -0.07 and 0 otherwise; *HI_GLCF*=1 if *GLCF* is greater than 0.07 and 0 otherwise; *DWC*=change in working capital accounts from the statement of cash flows scaled by average assets for year t; *LO_DWC*=1 if DWC is less than -0.3 and 0 otherwise; *HI_DWC*=1 if DWC is greater than 0.3 and 0 otherwise; *DFO*=change in other funds from operations from the statement of cash flows scaled by average assets for year t; *LO_DFO*=1 if DFO is less than -0.07 and 0 otherwise; *HI_DFO*=1 if DFO is greater than 0.07 and 0 otherwise; *DAL*=change in other assets and liabilities from the statement of cash flows scaled by average assets for year t; *LO_DAL*=1 if DAL is less than -0.01 and 0 otherwise; *HI_DAL*=1 if DAL is greater than 0.01 and 0 otherwise; *ROA = PTBI/AT*.

Figure 1
Time-Series Analysis of Firm-years that Progress from Growth to Maturity to Shake-out



This graph depicts means by life cycle stage of BTD and Earnings Persistence for 3,334 firm observations that move from growth to maturity to shake-out during the sample time period. BTD is as defined in Table 2. Earnings persistence is measured as $PTBI_{t+1}$ /PTBI.