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A closer examination of the book-tax difference pricing anomaly

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A CLOSER EXAMINATION OF THE BOOK-TAX DIFFERENCE PRICING ANOMALY

by

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CERTIFICATE OF APPROVAL

PH.D. THESIS

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To Katie and T.J.

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ABSTRACT

In this study, I examine whether the pricing of book-tax differences reflects mispricing or a priced risk factor. I provide new evidence that temporary book-tax differences are mispriced by developing portfolios that trade on the information in book-tax differences for future accruals and cash flows. I develop and test predictions on whether book-tax difference mispricing is the value-glamour anomaly in disguise. Both signals of mispricing relate to firm growth and, thus, both may capture mispricing due to over-extrapolation of realized growth to future growth. I find that the book-tax difference pricing anomaly is subsumed by the value-glamour anomaly. Specifically, trading on the information in book-tax differences does not yield incremental returns relative to a value-glamour trading strategy. Hence, mispricing associated with book-tax differences relates more generally to the mispricing of expected growth as extrapolated from past growth.

PUBLIC ABSTRACT

In this study, I examine whether the pricing of book-tax differences reflects mispricing or a priced risk factor. I provide new evidence that temporary book-tax differences are mispriced by developing portfolios that trade on the information in book-tax differences for future accruals and cash flows. I develop and test predictions on whether book-tax difference mispricing is the value-glamour anomaly in disguise. Both signals of mispricing relate to firm growth and, thus, both may capture mispricing due to over-extrapolation of realized growth to future growth. I find that the book-tax difference pricing anomaly is subsumed by the value-glamour anomaly. Specifically, trading on the information in book-tax differences does not yield incremental returns relative to a value-glamour trading strategy. Hence, mispricing associated with book-tax differences relates more generally to the mispricing of expected growth as extrapolated from past growth.

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CHAPTER 1. INTRODUCTION

In this study, I investigate two related research questions. First, are book-tax differences mispriced? Second, to what extent are the pricing effects of book-tax differences explained by the value-glamour anomaly? Book-tax differences (or BTDs) are financial reporting income less taxable income, as estimated from the financial statements. Taxable income, as a distinct measure of corporate profitability from book income, arguably contains information incremental to that in book income for earnings quality and expected future earnings. If market participants fail to appreciate the implications of BTDs for future earnings, BTDs will predict future returns. Prior research provides mixed evidence on the association between BTDs and future returns (Lev and Nissim 2004; Hanlon 2005; Weber 2009; Chi, Pincus, and Teoh 2014). I use cross-sectional return predictability and time-series asset pricing tests to provide new evidence on whether the relation between BTDs and future returns reflects mispricing or a priced risk factor. To understand the mechanism through which BTDs relate to future returns, I examine whether and to what extent BTD mispricing is distinct from the value-glamour anomaly.[1]

For BTDs to be mispriced, two conditions must be met. First, BTDs must contain information for future earnings. Prior research demonstrates that BTDs are related to measures of earnings quality: earnings management (Phillips, Pincus, and Rego 2003; Blaylock, Shevlin, and Wilson 2012), one-year-ahead earnings persistence (Hanlon 2005),

[1] Throughout the paper, I use the terms "mispricing" and "anomaly" to mean abnormal returns to a zero-investment portfolio on the variable(s) of interest that cannot otherwise be explained by the factors of standard asset pricing models. Fama (1977, 1991, 2014) explains that any test of market efficiency is jointly a test that, under the null hypothesis, (a) the market is efficient and (b) the equilibrium expected returns are constant (i.e., the model is 'correct'). Hence, one cannot reject market efficiency while accepting the model, which implies true mispricing is not knowable. Setting aside concerns about the identifiability of true mispricing allows the researcher to document patterns in returns that suggest arbitrage opportunities. Whether exploitable or not, such evidence can improve the cost effectiveness of the arbitrage mechanism by reducing search costs (Lee 2001).

and longer-term earnings growth (Lev and Nissim 2004). Second, equity market participants must not efficiently process and impound this information into stock prices. The literature advances two related reasons BTDs may be mispriced: (i) a fixation on the properties of bottom-line earnings, ignoring the respective properties of earnings components, and (ii) the opacity of tax disclosures. Sloan (1996) provides evidence in support of a fixation-based explanation for accrual and cash flow mispricing. Investors' failure to appreciate the properties of these more general components of income—accruals and cash flows—casts doubt on their ability to appreciate information for future earnings from a more indirect characteristic, such as book-tax differences.[2] Indeed, McGill and Outslay (2004, p. 754) describe tax disclosures, the source of information about BTDs, as "inscrutable." At best, these disclosures are complex and provide incomplete information of whether, when, and where a firm's income will be taxed. Thus, any failure of investors to reflect the information in BTDs in stock prices may be due to fixation on more general earnings attributes, to the opacity of tax-related information in financial statements, or to both.

Evidence of BTD mispricing is not conclusive (Graham, Raedy, and Shackelford 2012). Prior results from tests of BTD mispricing do not align with predictions based on investors fixating on total earnings before tax expense. For example, Hanlon (2005) finds that investors *correctly* price pretax accruals for firm-years with large positive BTDs. Yet, pretax accruals are less persistent for such firm-years. If, on average, investors overweight accrual persistence, then the lower persistence suggested by large BTDs should lead to

[2] An alternate view posits that investors have limited attention, which may be due to cognitive limitations or costly information processing (Hirshleifer and Teoh 2003; Chi et al. 2014). Whether the result of limited attention or fixation, the resultant mispricing should exhibit similar patterns in expectation.

more mispricing under the functional fixation hypothesis. Additional mixed evidence of BTD mispricing comes from annual cross-sectional return predictability tests. On average, pretax accruals are negatively related to future returns. However, Hanlon (2005) finds pretax accruals are not significantly related to average future returns when firms have either large positive or large negative BTDs. Moreover, Lev and Nissim (2004) document a negative relation between BTDs and future returns; however, the relation is insignificant after the adoption of SFAS No. 109 (FASB 1992). These findings are inconsistent with investors systematically overlooking the information in BTDs. As Graham et al. (2012, p. 429) state, "[t]he mixed results of these market tests are puzzling and difficult to reconcile."

Documenting an association between BTDs and mispricing does not preclude the possibility of such mispricing being attributable to an alternate source of mispricing. As Graham et al. (2012, p. 431) note, "it is not clear whether the observed [BTD] pricing behavior relates to the market's attempts to actually price taxable income or whether the market is merely pricing a component of […] income." To consider whether BTD mispricing is attributable to tax information or something more general, I examine whether returns to a BTD trading strategy are incremental to an empirically robust and plausibly related mispricing phenomenon—the value-glamour anomaly.

Value-glamour mispricing is based on investors erroneously extrapolating past growth to future growth (e.g., Lakonishok, Shleifer, and Vishny 1994; Chan and Lakonishok 2004). For "glamour" firms, investors observe high past growth and anticipate high future growth. For "value" firms, investors observe low past growth and expect low future growth. As extreme growth mean-reverts, predictable price corrections occur consistent with overly optimistic (pessimistic) expectations: glamour (value) firms generate abnormal negative (positive) future returns.[3] This pattern provides a profitable hedge strategy short in glamour stocks and long in value stocks.

A priori, value-glamour serves as a natural starting point for understanding what information is being mispriced for three reasons. First, both sources of mispricing relate to firm growth. Lev and Nissim (2004) demonstrate BTDs are related to one-, three-, and five-year-ahead earnings growth. Prior research also finds that BTDs are correlated with growth proxies (Jackson 2015) as well as Jones (1991) model abnormal accruals, which are misspecified in the presence of firm growth (Blaylock et al. 2012; McNichols 2001; Collins, Pungaliya, and Vijh 2015). Second, both mispricing anomalies are based on a failure to fully incorporate the implications of accounting information for future earnings. Hence, both expectation errors are predicted to reverse at future earnings announcements. Third, both anomalies can be characterized as long-term reversal phenomena, where investors over-react to information, only to reverse their errors upon receiving new information.[4] These three commonalities between BTD mispricing and the value-glamour anomaly suggest both mispricing patterns may be manifestations of the same underlying phenomenon.

[3] Fama and French (1995, 1996, 1998) argue book-to-market value (BE/ME), one of several proxies for value-glamour, reflects distress risk and hence a priced risk factor. The variation in the factor-mimicking returns to BE/ME captures exposure to, and hence compensation for, this type of risk. This is shown by the ability of the risk factor to explain returns in 25 size-BE/ME sorted portfolios. However, beyond those portfolios, the explanatory power of this risk factor has foundered with respect to returns to portfolios sorted on alternate value-glamour proxies (Chan and Lakonishok 2004). In this study, because I exclude firm-years with negative pre-tax income, I take the view that value-glamour mispricing is distinct from priced distress risk. Additionally, the sample is comprised of large, profitable firm-year observations, which likely exhibit low exposure to distress risk, relative to the population. Hence, distress risk alone is unlikely to explain my results.

[4] This contrasts with short-term momentum phenomena, such as post-earnings announcement drift, where investors under-react to existing information which produces positive autocorrelations in returns over short horizons.

My first set of analyses examines whether the information in BTDs for future earnings predicts future returns. I begin by re-examining evidence from Fama-MacBeth cross-sectional return predictability tests. I test whether future returns are associated with temporary, permanent, and total BTDs, respectively.[5] In prior work, such cross-sectional tests have generated mixed evidence of a relation between BTDs and future returns. I posit several reasons for this mixed evidence: noisy security-level returns, a limited time-series of annual returns, and a high concentration of returns during the late 1990s when stock prices diverged greatly from underlying earnings (e.g., Shiller 2005). I take several steps to address these potential explanations for the inconsistency in results across prior studies. First, I conduct tests with monthly returns, which improves interpretability by avoiding overlapping return windows, which otherwise would occur with firm-year-level observations. Second, I take advantage of the longer time-series of data available since the adoption of SFAS No. 109.[6]

While Chi et al. (2014) also extend the post-SFAS No. 109 sample relative to that of Lev and Nissim (2004) and Hanlon (2005), my results complement and extend those of Chi et al. (2014) in three key ways. First, I conduct tests following Hanlon's (2005) specifications. These tests investigate how the ability of pretax accruals and pretax cash flows to predict returns varies with temporary BTDs. Second, I contribute new evidence to the tax literature by conducting time-series asset pricing tests using portfolios constructed

[5] A book-tax difference is a transaction that receives differential reporting treatment for tax and financial reporting purposes, respectively. Book-tax differences are of two types: temporary and permanent. Temporary differences are transactions that will be included in income for both tax and financial reporting but in different accounting periods (see, e.g., Scholes et al. 2014; ASC 740-10-20). Permanent differences, while not explicitly referred to as such in current U.S. GAAP, are those transactions that are reflected under one system of income but never the other. Total book-tax differences represent the sum of temporary and permanent differences.

[6] The sample periods of Lev and Nissim (2004) and Hanlon (2005) end in 2000. Chi et al. (2014) extend their sample through 2009, but they also include six years of data where SFAS No. 109 was not in effect.

sorted on total BTDs, temporary BTDs, and permanent BTDs, respectively. These portfolios are designed to capture the direct pricing of book-tax differences. A fourth set of portfolios are designed to mimic a trading strategy based on the evidence from Hanlon (2005) by combining the information in temporary BTDs, pretax accruals, and pretax cash flows. Finally, I examine whether the pricing effects associated with BTDs appear to be another anomaly in disguise—namely, the value-glamour anomaly.

Time-series asset pricing tests advance the literature on the pricing of book-tax differences by providing a test of priced risk versus mispricing. Specifically, I employ time-series asset pricing tests to examine whether returns are explained by established risk factors (Fama and French 1993, 2015). Firm-years are sorted into portfolios based on whether BTDs predict investors should over-weight the information for future earnings, accruals, and cash flows (a short portfolio) and under-weight information for future earnings, accruals, and cash flows (a long portfolio).[7] Using multi-factor asset pricing models (Fama and French 2015), I test the null hypothesis that the pricing errors (or "alphas") are individually and jointly equal to zero (Fama and French 2015, 2016; Gibbons, Ross, and Shanken 1989). Positive and statistically significant alphas for the hedge portfolio formed on book-tax differences supports the conclusion that book-tax differences are mispriced.

Like the prior literature, my evidence on the return predictive ability of book-tax differences is mixed. Monthly cross-sectional return predictability tests link total book-tax

[7] The results of Lev and Nissim (2004) and Chi et al. (2014) suggest that firm-years can be grouped and sorted based on their measures of book-tax differences (*TI/BI*, *TEMP/BI*, and *PERM/BI*) alone. The results of Hanlon (2005) suggest that, under the *BTD/A* metric, pre-tax accruals and pre-tax cash flows must also be taken into consideration to evaluate whether the *BTD/A* signal predicts under- or over-pricing. Refer to Chapter 5 for more information on *BTD/A*-based sorting.

differences to average future monthly returns, holding constant known risk proxies and other control variables. Temporary book-tax differences appear to explain variation in the relation between pretax accruals and future returns as well as pretax cash flows and future returns. By contrast, I fail to reject the null hypothesis of no relation between temporary (permanent) book-tax differences and future returns. Moreover, while statistically significant, total book-tax differences do not appear economically meaningfully related to future returns. Hence, I find some, albeit limited evidence, that large BTDs are a predictor of lower future returns.

Portfolio time-series asset pricing tests demonstrate that sorting on the BTD dimension alone produces significant factor-model pricing errors. A zero-investment hedge portfolio trading strategy that combines temporary book-tax differences, pretax accruals, and pretax cash flows generates an estimated hedge portfolio alpha of 91.4 basis points per month from April 1995 through December 2014. This equates to an annualized abnormal return of 11.5 percent and supports the possible existence of a BTD pricing anomaly. Similar trading strategies based on total (temporary) book-tax differences generate 22.2 (12.6) basis points per month, which translates to an annualized abnormal return of 2.7 (1.5) percent. While statistically significant, the economic magnitude of these latter two results casts doubt on total BTDs and temporary BTDs serving as meaningful signals of arbitrage opportunities.

The evidence from time-series asset pricing tests is critical to the determination of mispricing versus priced risk. Such tests demonstrate the plausibility of a trading strategy based on BTDs, after removing (i) the portion of returns explained by exposure to systematic risk factors and (ii) any returns to idiosyncratic risk. The tests address a concern of Botosan and Plumlee (2005) related to cross-sectional return predictability tests: realized returns are a biased proxy for expected returns, and such bias may relate to book-tax differences in the cross-section (Elton 1999). Hence, cross-sectional tests may incorrectly reject the null hypothesis of no mispricing due to a link between BTDs and risk, if that risk is not adequately controlled in the cross-sectional specifications.[8] Time-series asset pricing tests mitigate concerns that cross-sectional results are an artifact of an omitted risk factor. Specifically, these tests have the advantage of estimating abnormal returns while controlling for intertemporal exposure to systematic risk factors.

My next set of analyses examines whether BTD mispricing is distinct from value-glamour mispricing. This represents an important step in understanding *what* investors are mispricing with respect to BTDs and whether BTDs, because of the information in taxable income, identify incremental hedge alpha. Following Desai, Rajgopal, and Venkatachalam (2004), I operationalize value-glamour using operating cash flows-to-price (*CFO/P*).[9] Desai et al. (2004) find this value-glamour proxy explains the returns to other value-glamour proxies (e.g., sales growth, book-to-market, and earnings-to-price) and the returns to accruals. A concern is that this measure captures accrual mispricing through the strong, negative correlation between cash flows and accruals. However, prior work in this area finds that operating cash flows, when scaled by *assets*, exhibit predictive ability for future

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[8] For instance, BTDs may relate to firm-specific returns on average through "tax risk." Extant research suggests that tax risk captures many dimensions of firm-specific risk, such as business model risk, transactional risk, political risk, as well as tax compliance risk (Guenther, Matsunaga, and Williams 2013; Hutchens and Rego 2015; Neuman, Omer, and Schmidt 2014).

[9] *CFO/P* improves upon an existing proxy of value-glamour, cash flow-to-price, which the extant literature estimates as operating income before depreciation expense divided by market value of equity. This represents an improvement because, except for firms with short operating cycles, operating income will be a noisy measure of operating cash flows. While improved, the intuition nevertheless remains the same: scaling cash flows by price estimates the valuation multiple of cash earnings and hence captures expected growth in cash earnings.

returns incremental to that of accruals, which suggests that cash flow mispricing overlaps with but is not perfectly subsumed by accrual mispricing (Houge and Loughran 2000; Hribar and Yehuda 2015). Scaling by *price*, Desai et al. (2004) find operating cash flows explain the returns to the accrual anomaly. This latter metric serves as a parsimonious measure that explains returns to both the accrual and the value-glamour anomalies, and suggests that the two anomalies are indeed one. The relevant empirical question, then, is whether BTD mispricing and value-glamour mispricing reflect a shared source or distinct sources of mispricing. Finding that BTDs and *CFO/P* identify shared alpha suggests that the signals capture the same latent phenomenon as asset pricing anomaly returns typically exhibit low pairwise correlations (Green, Hand, and Zhang 2014).

To address this question, I add the value-glamour proxy, *CFO/P*, to the cross-sectional return predictability models and re-estimate whether BTDs are related to future returns. With the addition of *CFO/P* as a conditioning variable, the ability of book-tax differences to predict future returns becomes indistinguishable from zero. I further test for significant attenuation of the coefficient after adding *CFO/P* using the method of Clogg, Petkova, and Haritou (1995) for comparing coefficients between models. In general, the evidence from this test suggests that the addition of *CFO/P* produces a significant attenuation in the coefficient value. These results provide evidence that value-glamour may explain the relation between book-tax differences and future returns.

To examine whether the BTDs and value-glamour reflect the same underlying mispricing phenomenon, I next construct portfolios based on two-way, independent sorts along a BTD dimension and the value-glamour dimension. This leads to four sets of nine portfolios sorted on one of four BTD metrics and on *CFO/P*.[10] I also estimate the returns to hedge control portfolios, where the hedge returns to BTDs (value-glamour) are estimated within each value-glamour (BTD) portfolio (e.g., Desai et al. 2004). Results suggest that the value-glamour trading strategy continues to generate significant hedge alpha, even after controlling for BTDs. However, the BTD trading strategies fail to consistently produce significant alpha once value-glamour controls are imposed. Additionally, the negative (positive) abnormal returns tend to cluster in the short (long) portfolio of value-glamour irrespective of the BTD portfolio, which suggests value-glamour represents the dominant pricing anomaly. These results suggest the anomalous returns associated with BTDs are subsumed by those of the value-glamour anomaly.

My findings have important implications for investors as well as finance and accounting researchers. Because this study points to a parsimonious factor that explains mispricing associated with BTDs, this study should be of interest to investors. Identifying signals of mispricing is critical to the cost-effectiveness of the arbitrage mechanism. On the one hand, if the evidence points to a new source of mispricing, then capital can be allocated more efficiently as the arbitrage mechanism corrects the mispricing (Lee 2001). On the other hand, if the evidence suggests a shared relation between previously identified sources, the cost-effectiveness of the arbitrage mechanism still is enhanced by reducing search costs. My results are useful in the latter sense: the findings imply a potential misidentification of the value-glamour anomaly as BTD mispricing.

My study also furthers accounting and finance research by demonstrating that BTDs do not represent a distinct mispricing phenomenon, which points to limitations in

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[10] I do not tabulate the results from sorting on permanent book-tax differences, scaled by book income, and *CFO/P*, as my results do not provide evidence of mispricing related to this measure of BTDs.

inferences about the information contained in taxable income. I answer the call of Graham et al. (2012) for more research that examines the pricing of estimated taxable income. They assert that “[f]urther analysis is needed to assess what exactly the market is pricing” (p. 431). My results suggest that investors are mispricing growth: they expect extreme past growth to persist, but instead it mean reverts, producing predictable returns. BTDs appear to share an association with value-glamour mispricing, the dominant anomaly, which I conjecture is the result of BTDs being a measure of past growth.

CHAPTER 2. RELATED LITERATURE AND RESEARCH QUESTIONS

In this section, I develop support for the two objectives of my study within the context of related prior literature. I begin by discussing tax research in accounting that documents that taxable income and book-tax differences have implications for future earnings but provides mixed evidence of a pricing anomaly related to book-tax differences. I next describe the subset of accounting research that questions whether accrual mispricing is linked to growth mispricing. Finally, I summarize the literature on the value-glamour anomaly and investor errors-in-expectations of future growth.

2.1. Evidence on the Pricing Implications of Book-Tax Differences

In this study, I am interested in the market's pricing of estimated book-tax differences or BTDs. Four studies (i.e., Lev and Nissim 2004; Hanlon 2005; Weber 2009; and Chi et al. 2014) test whether book-tax differences, as estimated from publicly available financial statements, provide information that is not fully appreciated by market participants.[11] Lev and Nissim (2004) examine the ability of *total* book-tax differences, which relies on current tax expense, to predict future returns. Their total BTD metric predicts one-, three-, and five-year-ahead earnings growth. They find BTDs are associated with future returns, and attribute this finding to a failure by investors to efficiently process the information in BTDs for future earnings. However, after the enactment of SFAS No.

[11] Two studies examine the pricing of tax expense adding controls for book earnings. Thus, these studies indirectly address the pricing of book-tax differences. Schmidt (2006) examines whether the annual tax change component of earnings, i.e. earnings that are attributable to changes in ETRs, are priced separately from the residual component of earnings. Thomas and Zhang (2011) demonstrate that changes in quarterly tax expense per share predict future tax expense changes (i.e., "tax momentum") and that this momentum effect predicts future returns.

109, the association becomes insignificant, which the authors claim is due to a change in investor focus due to regulatory bodies drawing attention to the increasing book-tax gap in the years after SFAS No. 109 (Shevlin 2001). Graham et al. (2012) express skepticism about this explanation. They note that it is unclear what about the standard changes investors' ability to efficiently process and incorporate tax information into stock prices.

Hanlon (2005) examines whether *temporary* book-tax differences serve as a signal to investors of the persistence of earnings, accruals, and cash flows. She finds that firm-years with relatively large BTDs have less persistent earnings, accruals, and cash flows.[12] To address whether investors efficiently price the information in BTDs for earnings persistence, her study jointly estimates a persistence and a pricing equation using the Mishkin (1983) methodology.[13] Kraft, Leone, and Wasley (2007) explain that Mishkin tests suffer a potential omitted correlated variable bias insofar as variables excluded from the model must be rationally priced. Setting aside concerns of any omitted variable bias, the results themselves appear inconsistent with fixation on bottom-line earnings.

Given functional fixation, if large BTDs indicate lower persistence of both accruals and cash flows, then accruals should be *more* mispriced and cash flows *less* so. This follows from the arguments of Sloan (1996) that, in fixating on the overall persistence of earnings, investors fail to recognize and price the differential persistence of earnings components—accruals and cash flows. Specifically, accruals are less persistent than cash flows. Hence, market participants systematically over-weight (under-weight) the persistence of accruals

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[12] Earnings management, in part, explains the reduced earnings persistence for firm-years with large deviations of book income over taxable income (Blaylock et al. 2012). Large negative BTDs, by contrast, may provide an indication of contraction of late-life-cycle firms (Drake 2015). These explanations for lower earnings persistence when firms have large BTDs suggest a link between BTDs and past firm growth.

[13] Hanlon (2005) finds evidence of accrual and cash flow mispricing for extreme BTDs, but these results should be interpreted with caution.

(cash flows), which produces predictably negative (positive) future returns when earnings are comprised primarily of accruals (cash flows). However, the evidence in Hanlon (2005) appears inconsistent with earnings-based fixation. When firm-years have large positive BTDs, pretax accruals appear correctly priced and pretax cash flows *more* mispriced relative to when firm-years have small BTDs. Hence, the findings are inconsistent with the predictions based on functional fixation.[14]

Complementing Lev and Nissim (2004), Weber (2009) provides evidence that supports a mispricing-based explanation over a risk-based explanation for the relation between BTDs and future returns. Weber (2009) observes that analysts' forecast errors are systematically related to BTDs, which supports the claim that sophisticated market participants do not appreciate the information in BTDs for future earnings growth.

Chi et al. (2014) extend Lev and Nissim (2004) by estimating monthly cross-sectional tests of return predictability. Chi et al. (2014) document a relation between BTDs and future returns and demonstrate that the relation is incremental to three plausibly-related sources of mispricing: percent operating accruals (Hafzalla, Lundholm, and Van Winkle 2011), the fundamental F-Score (Piotroski 2000), and tax momentum (Thomas and Zhang 2011). Additionally, they document evidence consistent with insiders and short-sellers trading on information in BTDs. While these additional tests complement tests of mispricing, they do not distinguish whether such trading behavior reflects trades executed on information in BTDs or an alternate signal of mispricing that is correlated with BTDs.

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[14] Alternatively, if large BTDs represent a signal, or "red flag," to investors of lower persistence of earnings and earnings components, then both accruals and cash flows should be less mispriced in the extreme quintiles of the distribution of BTDs, relative to intermediate quintiles. Interpreted as a signal, the evidence still remains inconsistent as the signal does not appear to be fully incorporated into price. Large positive BTDs appear to signal lower accrual persistence but not lower cash flow persistence. Likewise, large negative BTDs appear to signal lower cash flow persistence but not lower accrual persistence.

My study differs from Chi et al. (2014) in several ways. First, while my tests of cross-sectional return predictability complement the evidence from Chi et al. (2014), I also provide evidence of BTD mispricing using a time-series portfolio approach. Time-series asset pricing tests are designed to test whether portfolio returns reflect exposure to systematic risk factors and hence compensation for bearing risk. Additionally, I re-examine the evidence of abnormal returns to BTDs using not only the measure of Lev and Nissim (2004), but also that of Hanlon (2005), which affects pricing through its implications for the persistence of pretax accruals and pretax cash flows. Most importantly, I examine whether the value-glamour anomaly explains returns to a BTD-based trading strategy. This latter analysis provides new evidence on what investors are mispricing when researchers find that BTDs are associated with future returns.

2.2. Research Linking Accrual Mispricing to Growth Mispricing

Sloan (1996) documents evidence that investors misprice accruals. Subsequent research has debated whether the accrual anomaly is mispricing. From this wide body of literature, I am interested in the subset of studies that examines whether and to what extent the returns to the accrual anomaly can be explained by firm growth mispricing. Collectively, this subset of studies suggests the anomalous returns to accruals can be explained by a more pervasive form of mispricing (i.e., growth mispricing).

Fairfield, Whisenant, and Yohn (2003) and Collins and Kim (2015) examine whether the accrual anomaly is distinct from firm-growth mispricing.[15] Fairfield et al. (2003) show that a substantial portion of the accrual anomaly is explainable by growth

[15] Zach (2006) also attributes accrual mispricing to differential firm growth, both past sales growth and expected future growth, as evidenced by book-to-market ratios.

mispricing reflected in long-term net operating assets. Collins and Kim (2015) note that mergers and acquisitions distort nominal measures of asset growth. There are two sources of growth when firms engage in M&A: merger-related growth and organic growth. They predict and find that accrual mispricing persists after controlling for the effect of artificial, merger-related growth mispricing, but that at least part of the accrual anomaly is attributable to a failure to account for this transitory form of growth in M&A firm-years.[16] These findings point to a link between realized firm growth and accrual mispricing and show that accrual mispricing exists, but to a lesser extent, after considering growth mispricing.

It is important to clarify how firm-growth mispricing, accrual mispricing, and BTD mispricing are related in the extant literature. First, Sloan (1996) and Hanlon (2005) examine the mispricing of accruals and cash flows. From this, one might view BTD mispricing as a subset of accrual mispricing, but the evidence from both Hanlon (2005) and Chi et al. (2014) suggests that it is incremental. Specifically, BTD mispricing represents incremental mispricing identifiable with cross-sectional variation in BTDs (Hanlon 2005) and predicts returns after controlling for percent operating accruals (Chi et al. 2014; Hafzalla et al. 2011). Second, while the focus in these studies is on the relation between accrual mispricing and the pricing of *realized* growth, the evidence still has implications for my study, even though I focus on *expected* growth. Importantly, for *realized* growth to be mispriced, it must guide *expected* cash flows, and those expectations

[16] Collins and Kim (2015) note that the accrual anomaly will not be confounded by merger-related transitory growth mispricing as long as accruals are measured from the cash flow statement (Hribar and Collins 2002). Instead, the confounding effects occur when accruals are measured from successive balance sheets. In this study, my measures of accruals and cash flows are based on cash flow statement data.

must contain common errors. In this study, I focus on the over-extrapolation of past growth to future growth, or the value-glamour anomaly.

2.3. Evidence on the Value-Glamour Anomaly

Lakonishok et al. (1994), La Porta, Lakonishok, Shleifer, and Vishny (1997), and Skinner and Sloan (2002), among others, provide evidence of superior returns to value stocks relative to those of glamour stocks. This result is often attributed to investor errors-in-expectations of growth. The expected growth of glamour stocks (low fundamentals-to-price) is over-estimated, whereas the expected growth of value stocks (high fundamentals-to-price) is under-estimated. These systematic misestimations of growth are the result of extrapolating extreme high and extreme low past growth, both of which exhibit a tendency to subsequently revert to the mean, into the future.[17] A contrarian trading strategy short on glamour stocks and long on value stocks exhibits positive hedge portfolio alpha as mean-reversion takes hold and these expectational errors are resolved (see Chan and Lakonishok 2004 for a review).

Beaver (2002) posits that the accrual anomaly is the value-glamour anomaly in “disguise,” and Desai et al. (2004) test this conjecture. Desai et al. (2004) present evidence that the accrual anomaly exhibits significant overlap with the value-glamour anomaly as captured by sales growth, book-to-market, earnings-to-price, and cash flow-to-price, respectively. Cash flows, in the cash flow-to-price metric, are typically estimated as operating income before depreciation expense. Desai et al. (2004) refine the cash flow-to-price metric by change the numerator to operating cash flows from the statement of cash flows. This adjusted value-glamour proxy, operating cash flows-to-price, explains the

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[17] Indeed, Lakonishok et al. (1994) conduct two-way sorts on realized growth and on expected growth to improve the identification of value and glamour firm-years, respectively.

predictable future returns to both accruals and the other value-glamour proxies. Their findings suggest that value-glamour mispricing subsumes accrual mispricing and that operating cash flows-to-price is a parsimonious measure that captures a shared source of mispricing.

It is possible that operating cash flows, through their negative relation with accruals, capture accrual mispricing. However, when scaled by assets, operating cash flows exhibit mispricing distinct from that of accruals (Houge and Loughran 2000; Hribar and Yehuda 2015). When scaled by price, operating cash flow-based portfolio returns subsume returns to portfolios sorted on accruals and returns to portfolios sorted on value-glamour measures. Hence, the claim that the negative correlation between cash flows and accruals leads operating cash flows to explain accrual mispricing is incomplete. The ability of operating cash flows-to-price also to explain returns to other value-glamour proxies suggests it is a parsimonious value-glamour proxy.

2.4. Research Questions

The discussion above provides motivation for this study's primary empirical questions. First, does the pricing of book-tax differences reflect mispricing or a priced risk factor? Second, to what extent are the pricing effects of book-tax differences explained by the value-glamour anomaly? The first line of inquiry follows from the evidence that book-tax differences are related to measures of earnings quality. If the persistence of earnings and its components, cash flows and accruals, varies with BTDs, as has been previously documented, and investors fail to recognize that information, then BTDs will be mispriced. Similarly, variation in future returns related to BTDs may reflect compensation for risk that is priced. I develop portfolio-based time-series asset pricing tests to examine whether pricing patterns associated with BTDs reflect mispricing or risk.

My second line of inquiry examines whether mispricing associated with BTDs is due to errors in expectations of growth. I posit three reasons why these two signals of mispricing may reflect the same underlying anomaly. First, both sources of mispricing relate to firm growth. Second, both mispricing anomalies are based on a failure to fully incorporate the implications of accounting information for future earnings. Hence, both expectation errors are predicted to reverse at future earnings announcements. Third, both anomalies can be characterized as long-term reversal phenomena, where investors overreact to information only to reverse their errors upon new information.[18] These three commonalities between BTD and value-glamour mispricing suggest the mispricing patterns may be related through the same underlying phenomenon.

Extant research links BTDs to firm growth. Aside from cross-sectional findings relating BTDs to growth in earnings and assets, several individual book-tax differences appear closely tied to firm-level growth. Consider, for example, depreciation expense, which is one of the more common *temporary* book-tax differences (Revsine, Collins, Johnson, and Mittlestaedt 2011; Scholes et al. 2014). A firm that grows its depreciable asset base will generate a large excess of book income over taxable income due to depreciation as newer assets are depreciated more rapidly for tax (e.g., double-declining balance under MACRS) than for book (e.g., straight-line). For this firm, extreme book-tax differences capture near-term realizations of growth. The opposite holds if a firm sells

[18] This contrasts with short-term momentum where investors under-react to existing information which produces positive autocorrelations in returns over short horizons.

assets that are not fully depreciated. Hence, for this common book-tax difference, a positive relation with firm growth exists.

Events related to changes in firm-growth, such as M&A and divestitures, can also give rise to large *temporary* BTDs. Guenther and Williams (2015) provide evidence that both large positive and large negative BTDs can arise in the year of an acquisition, depending on how the deal is treated for tax purposes (e.g., taxable or non-taxable) relative to acquisition accounting for book purposes. In the year(s) subsequent to M&A, write-offs of goodwill and intangible assets create large negative BTDs. Additionally, Guenther and Williams (2015) document that large positive BTDs arise when accounts receivable are written off, creating a large tax deduction whereas the related book earnings effect has been recognized previously through bad debt expense.

Another example is the *permanent* book-tax difference for the differential between foreign and domestic tax rates on foreign earnings.[19] This difference arises through the U.S. GAAP designation that foreign earnings as permanently reinvested abroad (or PRE).[20] As PRE increases, *ceteris paribus*, the permanent difference increases. Evidence suggests a positive association between PRE and firm growth abroad (Blouin, Krull, and Robinson

[19] Empirically, foreign tax rate differentials are captured as a permanent differences. However, in the truest sense, this difference does not arise from differential treatment of income or expense for book versus tax; rather, it arises because of differential statutory tax rates applied to income. Hence, this is arguably not a book-tax difference.

[20] U.S. law imposes tax on the income of a U.S. multinational corporation regardless of where it generates those earned. This is known as a worldwide tax regime. Generally, any incremental U.S. income tax on the earnings of controlled foreign corporate subsidiaries can be deferred until an intercompany distribution is made from that foreign subsidiary to its U.S. parent. U.S. GAAP requires a deferred tax liability be recorded for this future U.S. income tax at the time the foreign earnings are recognized. However, an exception exists that provides for delayed recognition of the deferred U.S. tax on foreign earnings when those earnings are characterized as permanently reinvested abroad. Designation of U.S.-controlled foreign subsidiary earnings as permanently reinvested earnings (or PRE) occurs under the "Indefinite Reversal Exception" (FASB ASC 740-30-25-17, formerly APB No. 23).

2014). Hence, the permanent BTD attributable to the difference in foreign and domestic tax rates will relate to growth in the foreign operations of U.S. multinationals.

The value-glamour mispricing anomaly is based on investors' erroneously extrapolating past growth to future growth (e.g., Lakonishok, Shleifer, and Vishny 1994; Chan and Lakonishok 2004). For "glamour" firms, investors observe high past growth and anticipate high future growth. For "value" firms, investors observe low past growth and expect low future growth. As extreme growth mean-reverts, predictable price corrections occur consistent with overly optimistic (pessimistic) expectations: glamour (value) firms generate predictably lower (higher) future returns.

A natural question is how realized growth reflected in BTDs relates to the value-glamour anomaly. Lakonishok et al. (1994) and others argue that the value-glamour anomaly results from investors observing extreme growth in the past and expecting that growth to carry over into the future. Because it is difficult to sustain extremely high growth and it is also unlikely that sluggish growth persists, these expectations prove erroneously optimistic and pessimistic, respectively. Their correction produces predictable returns in the subset of firms in extreme partitions of growth measures. While value-glamour is primarily about future growth, the expectations for that future growth are founded on past, realized growth. Hence, to the extent that extreme BTDs indicate extreme realized growth, they may be useful predictors of where investors err in their future growth projections.

CHAPTER 3. EMPIRICAL APPROACH, SAMPLE, AND PRIMARY VARIABLE MEASUREMENT

In my first set of tests, I conduct monthly cross-sectional return predictability tests and report the average of the monthly coefficients as well as the Fama-MacBeth (1973) *t*-statistics. I examine whether value-glamour explains BTD-based return predictability by adjusting these tests to include *CFO/P* as an additional explanatory variable. Using the method of Clogg et al. (1995),[21] I further test the attenuation of the coefficients on BTDs to provide statistical evidence of whether value-glamour explains BTDs return predictive ability.

In my second set of tests, I sort firm-years into portfolios on BTDs and value-glamour, respectively, and conduct time-series asset pricing tests with the portfolio returns. These asset pricing tests examine whether portfolio returns generate significant alpha, controlling for systematic returns to established risk factors (Fama and French 1993; 2015). I conduct both one-dimensional and two-dimensional portfolio sorts to assess the share of abnormal returns to a BTD trading strategy explainable by a value-glamour trading strategy, and vice versa.

3.1. Sample Selection

Data for my analyses are drawn from the intersection of the Compustat Fundamentals Annual File and the CRSP Monthly Stock File. The enactment of SFAS No. 109, *Accounting for Income Taxes*, overhauled the accounting for income taxes and hence

[21] The Clogg et al. (1995) procedure tests for a statistically significant change in a coefficient between reduced and full models. The full model includes all control variables whereas the reduced model excludes one variable. In this study, the reduced (full) model excludes (includes) *CFO/P*.

the reporting of that information in annual financial statements (FASB 1992).[22] To improve the homogeneity of the tax expense data, I limit my sample to begin after the effective date of SFAS No. 109. Specifically, I restrict my sample to firm-years beginning on or after June 1, 1994 and ending on or before December 31, 2014.[23] Table A1 presents additional sample selection criteria. Specifically, I remove firms not incorporated in the U.S. as well as mutual funds, trusts, REITs, limited partnerships, or other flow-through entities. This set of restrictions ensures that each sample firm is subject to taxation at the entity level in the United States. I further require non-missing assets and income as well as non-missing values for the Compustat items required to compute my control variables. The starting sample contains 73,816 firm-years.

I exclude 4,786 firm-years that are members of SIC codes for utilities (SIC 4900-4999) and financial services (SIC 6000-6999). This requirement is consistent with tax research, which argues that these firms face differing incentives to avoid taxes due to regulatory constraints.

Next, I delete 25,910 firm-years due to negative pre-tax income, which makes the book-tax difference metrics—especially those scaled by book income—difficult to interpret. In keeping with the value-glamour literature, I delete firm-year observations with

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[22] Broadly speaking, the major change that SFAS No. 109 made to the in-effect standard at the time (APB Opinion No. 11) was in shifting from an income statement approach to a balance sheet approach. A key difference from the predecessor standard was in the recognition and measurement of deferred tax assets.

[23] This end date is chosen to ensure, for all observations in a given fiscal year, a full 12-month return accumulation period beginning in the fourth months after year-end. At present, the CRSP Monthly File is updated through December 31, 2014. Therefore, if I included firm-years from fiscal 2013, any firm-year ending after September 30 will be dropped from the sample due to missing future returns.

negative book-to-market.[24] My final sample has 43,120 firm-years.[25] Monthly returns tests include 237 months of future returns spanning April 1995 through December 2014.

Aside from differences in sample periods, the sample selection criteria follow related studies on book-tax difference mispricing, allowing the evidence in my study to be more comparable with prior studies.[26] Moreover, this procedure ensures that inferences drawn in this study are not the result of unique sample selection criteria. Using this sample, I construct the measures for my tests. I focus the discussion on the primary independent and dependent variables used in this study—proxies for book-tax differences and measures of future realized returns.

3.2. Measurement of Book-Tax Differences

While many variations of book-tax difference measures exist in the literature, only a few have been linked to future returns. The first measure, one of total book-tax differences, is taken from Lev and Nissim (2004), and adapted by Chi et al. (2014). Chi et al. (2014) define *TI/BI* as follows:

$$TI/BI = \frac{\left(\frac{CTE}{\tau} - \Delta NOL\right) \times (1-\tau)}{NI},$$

where *CTE* is current tax expense, measured as current federal plus current foreign tax expense (Compustat: TXFED + TXFO) divided by τ—top federal statutory tax rate faced by U.S. corporations in that year—and ΔNOL is the change in tax loss carry-forwards

[24] After all other sample restrictions, firm-years with negative book-to-market ratios represent less than 2% of the final sample if included. Results are not sensitive to their exclusion.

[25] Prior studies (e.g., Hanlon 2005) also exclude firm-years with positive tax loss carryforwards. Removing these firm-years' results in a final sample 25,341 firm-years. My inferences are qualitatively unaffected by the inclusion of these firm-years.

[26] In untabulated robustness tests, I find that my inferences are not affected by limiting the sample to end in fiscal year 2000, consistent with both Lev and Nissim (2004) and Hanlon (2005), nor to the exclusion of fiscal year 1998 (Lev and Nissim 2004). Additionally, I find that my inferences are unaffected by requiring that all observations occur after the publication of Lev and Nissim (2004) and Hanlon (2005).

(Compustat: TLCF). For the sample period in consideration, τ represents a constant 35%.[27] *TI* is then multiplied by $(1-\tau)$ to make it comparable to net income (i.e., after tax). *NI* is net income before extraordinary items (Compustat: IB). I then conduct industry-year quintile rankings of *TI/BI*. To ensure that all trading strategies examined in this study are implementable, the quintile breakpoints for *TI/BI* are determined prior to portfolio formation using only the most recently available data at the time of formation. *TI/BI* is decreasing in total book-tax differences such that values closer to one represent small book-tax differences, whereas values closer to zero represent large book-tax differences.

Following Chi et al. (2014), I use two additional measures of book-tax differences: *TEMP/BI* and *PERM/BI*. *TEMP/BI* captures temporary book-tax differences. *TEMP* represents deferred tax expense (Compustat: TXDFED + TXDFO) divided by τ, then multiplied by $(1-\tau)$. *PERM/BI* captures permanent book-tax differences. Since permanent and temporary book-tax differences sum to total book-tax differences, *PERM* represents the portion of book-tax differences not captured by *TEMP*, and hence equals $[BI - TI] - TEMP$. Note, *PERM/BI* is similar to *TI/BI* in that it is decreasing in book-tax differences—values closer to one indicate small BTDs whereas values closer to zero indicate large BTDs.

The second measure, one of temporary book-tax differences, is taken from Hanlon (2005):

$$BTD/A = \frac{\left(\frac{DTE}{\tau}\right)}{Average\ Total\ Assets},$$

[27] It is worth noting that throughout the entire sample τ is not only cross-sectionally constant, but also time invariant as the federal government did not change the top marginal tax rate on corporate income during this period. Because it factors into all BTD metrics as a constant, it has no effect on the cross-sectional rankings and hence sorting into quintiles. Instead, the convention is employed to provide comparability with prior research.

where *DTE* represents deferred tax expense (Compustat: TXDFED + TXDFO), and *Average Total Assets* is the average of beginning and ending total assets (Compustat: AT) for the fiscal year. Note, *BTD/A* differs from *TEMP/BI* in that the former is scaled by average total assets, whereas the latter is scaled by income before extraordinary items (Compustat: IB). Prior research, following Hanlon (2005), divides book-tax differences into three groups—two extreme quintiles representing large negative *BTD/A* (*LNBTD*) and large positive *BTD/A* (*LPBTD*), respectively, and an intermediate group of the remaining observations (*SmallBTD*). To again ensure that all trading strategies examined in this study are implementable, I recalculate the 20th and 80th percentile breakpoints for *BTD/A* using only the most recently available data at the time of assignment. Because of the similarity in measurement of *BTD/A* and *TEMP/BI*, I expect these measures to be highly positively correlated.

Table A2 provides descriptive statistics for *BTD/A*, *TI/BI*, *TEMP/BI*, *PERM/BI*, *CFO/P* and other control variables. The mean and median of *BTD/A* are near zero, suggesting that the average firm-year has small temporary book-tax differences. A value of one for *TI/BI* indicates no difference between book income and taxable income. The average and median values of *TI/BI* are less than one, consistent with prior research, suggesting the average firm-year has book income in excess of estimated taxable income. Further, in Table A3, both the Pearson product-moment correlation and the Spearman rank correlation between *BTD/A* and *TI/BI* are negative and statistically significant at the one-percent level. This negative relation is consistent with *TI/BI* reflecting book-tax differences inversely. All of the measures of book-tax differences are highly correlated in the expected direction given their measurement. For example, *BTD/A* and *TEMP/BI* exhibit very high correlation (ρ_p = 0.51, $p < 0.01$ and ρ_s= 0.90, $p < 0.01$), which is expected since the numerators are derived from deferred tax expense, as captured in Compustat.

Table A3 provides evidence supporting a relation between the book-tax difference proxies and the value-glamour proxy. *TI/BI* and *PERM/BI*, which are both decreasing in book-tax differences, are each negatively correlated with *CFO/P*. *BTD/A* and *TEMP/BI*, which both capture temporary book-tax differences, are each positively correlated with *CFO/P*. Overall, univariate evidence is consistent with a positive relation between book-tax differences and value-glamour.

3.3. Measurement of Future Returns

All returns in this study represent buy-and-hold returns measured over monthly periods. For each firm-year, the 12-month trading window begins in the fourth month after the fiscal year-end and ends in the third month of the following fiscal year.[28] Returns are adjusted to account for any potential delisting bias. When a delisting occurs in the middle of a month, the delisting month's return is computed as the product of the partial month return multiplied by the delisting return (Beaver, McNichols, and Price 2007). If the delisting return is missing, the delisting return is set to -35 percent for securities listed on NYSE and AMEX and -55 percent for those on NASDAQ (Shumway 1997; Shumway and Warther 1999; Hanlon 2005). For the remainder of the estimation period (i.e., until new breakpoints are available for monthly returns), the returns are adjusted such that the post-

[28] In some respects, this is a conservative assumption as form 10-K filing deadlines have shifted forward over the sample window for certain firms. Until 2002, all firms were required to file their 10-K within 90 days of fiscal year-end. For firm-years ending on or after December 15, 2002 and with a public float (i.e., the dollar value of non-locked-in shares outstanding) of $75 million or more, the filing window was reduced to 75 days. In 2006, the SEC created a third tier of filers, "large accelerated filers," or those with $700 million or more in public float, which was required to file within 60 days of year end. Since 2006, there are three tiers of filers—large accelerated filers, accelerated filers, and non-accelerated filers—with three filing deadlines—60 days, 75 days, and 90 days, respectively (SEC Releases No. 33-8128 and 33-8644).

delisting proceeds are reinvested in the same size-decile portfolio to which the delisted security belonged just prior to delisting.

CHAPTER 4. CROSS-SECTIONAL RETURN PREDICTABILITY TESTS

I estimate two cross-sectional specifications to test the relation between BTDs and average future returns. Different from Lev and Nissim (2004), which conducts *annual* cross-sectional Fama-MacBeth tests, my specifications are estimated with returns measured over *monthly* periods (*T*=237 months). To test the pricing of *TI/BI*, *TEMP/BI*, and *PERM/BI*, I estimate the following cross-sectional return predictability regressions:

$$\left(R_i - R_f\right)_{t+1} = \beta_0 + \beta_1\{TI/BI_{i,t}, TEMP/BI_{i,t}, PERM/BI_{i,t}\}$$

$$+ \Sigma_k \beta_k Control_{k,i,t} + \varepsilon_{i,t+1} \qquad (1)$$

where $R_i - R_f$ represents security-specific future monthly returns in excess of the risk-free rate. I estimate the equation three times, alternating the book income-scaled BTD measure that is included. All independent variables for a given monthly cross-section are measured such that they become available in the month before the current month, unless they are based on annual data in which case they become available in the fourth month after the fiscal year end. Additionally, all independent variables represent annual decile ranked-scaled transformations (i.e., ranked 0 through 9, divided by 9, so that each regressor ranges from 0 to 1), with rankings based on breakpoints derived from observable realized data at the time of the estimation to avoid look-ahead bias. I include the following variables to control for known determinants of expected returns: CAPM beta, size, growth, long-term momentum, long-term reversal, and new issuances. I also include controls based on Guenther (2011), including firm age and indicator variables that capture extreme values of special items, non-operating income, and non-recurring gains and losses. He suggests these variables explain observations influential to the relation between BTDs and earnings persistence.

Given that *TI/BI* and *PERM/BI* are decreasing in book-tax differences, which are negatively related to earnings quality, I predict β_1 will be positive. *TEMP/BI* is neither increasing nor decreasing in temporary book-tax differences. Rather, large temporary book-tax differences are the extreme values of *TEMP/BI*, with large negative (positive) temporary book-tax differences representing the lowest (highest) values. Therefore, I do not make an explicit prediction on β_1 for *TEMP/BI*. However, the evidence from Chi et al. (2014) suggests that it is negatively related to future returns.

Hanlon (2005) documents evidence that firm-years with extreme book-tax differences exhibit differential pricing of pretax accruals and pretax cash flows. The lower extreme represents the lowest quintile of *BTD/A*, where taxable income exceeds book income (i.e., large negative BTDs or "*LNBTD*"). The upper extreme represents the highest quintile of *BTD/A*, where book income exceeds taxable income (i.e., large positive BTDs or "*LPBTD*"). I denote the middle three quintiles as "*SmallBTD*." Following Hanlon (2005), I test whether book-tax differences have implications for the pricing of pretax accruals and pretax cash flows by estimating the following regression on the full sample and then within each partition of *BTD/A*—*LNBTD*, *SmallBTD*, and *LPBTD*:

$$\left(R_i - R_f\right)_{t+1} = \beta_0 + \beta_1 PTACC_{i,t} + \beta_2 PTCF_{i,t} + \Sigma_k \beta_k Control_{k,i,t} + \varepsilon_{i,t+1} \quad (2)$$

where *PTCF* represents pretax cash flows, estimated as cash flows from operations (Compustat: OANCF) plus cash taxes paid (Compustat: TXPD), scaled by lagged total assets (Compustat: AT), and *PTACC* represents pretax accruals, estimated as pretax book income (Compustat: PI) less pretax cash flows from operations, scaled by lagged total assets (Compustat: AT). As in Equation (1), all variables in Equation (2) represent annual scaled decile-ranked transformations based on breakpoints designed to avoid look-ahead bias. Hanlon (2005) documents that both accruals and cash flows are less persistent in the extreme quintiles of *BTD/A*. On average, β_1, the cross-sectional coefficient on *PTACC*, should be negative. For *LNBTD* and *LPBTD*, β_1 should be more negative than for *SmallBTD* under the alternative hypothesis of earnings fixation. On average, β_2, the cross-sectional coefficient on *PTCF*, should be positive. For *LNBTD* and *LPBTD,* β_2 is predicted to be less positive relative to *SmallBTD* under the alternative hypothesis of earnings fixation.

In all cross-sectional tests, I report the average of the monthly cross-sectional coefficient estimates. For each coefficient, Fama-MacBeth (1973) t-statistics are estimated as the average of monthly estimates for each coefficient scaled by the standard error of the monthly coefficients. Standard errors are adjusted to account for heteroscedasticity and serial correlation using lag length of 4 (Newey and West 1987).[29]

Next, I test whether the returns to BTDs appear robust to trading on a value-glamour sort. I modify Equations (1) and (2) to include the decile ranked-scaled values of *CFO/P* as a covariate in each specification. This allows me to assess whether the BTD signal exhibits predictive ability for future returns controlling for value-glamour. I then test for a significant attenuation in the coefficients of interest using the method of Clogg et al. (1995).

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[29] Greene (2007, 643) recommends setting the truncation lag length, L, equal to $\sqrt[4]{T}$, rounded to the nearest integer, where T is the number of time periods in the estimation. Here, T = 237, so L = 4.

4.1. Discussion of Results: Book Income-Scaled Book-Tax Differences

The results of estimating Equation (1) are presented in Table A4, Panel A. In Column (1), I document a modest positive relation between *TI/BI* and average monthly returns. Specifically, the coefficient on *TI/BI* is 0.154 ($p < 0.05$), which suggests that *TI/BI* is incrementally useful in predicting future returns. Interestingly, this result obtains after including the Guenther (2011) control variables, which suggests that the influential observations in the BTD-earnings persistence relation are not the influential observations in the BTD-return predictability relation. Notwithstanding the statistical significance of this result, the economic magnitude of 15.4 basis points per month is quite meager compared to other known anomalies. In columns (2) and (3), I fail to find statistically significant evidence of a relation between *TEMP/BI* and *PERM/BI*, respectively, and future returns.

In Column (3) of Table A4, Panel A, I include a control variable for the value-glamour characteristic, *CFO/P*. The inclusion of this control yields a statistically insignificant coefficient on *TI/BI*. By contrast, *CFO/P* is statistically significant at the one percent level (two-tailed). I further document a statistically significant (at the ten percent level) attenuation in the coefficient on *TI/BI*. Moreover, I again fail reject the null of no relation between *TEMP/BI* (*PERM/BI*) and future returns after including *CFO/P*.

4.2. Discussion of Results: Asset-Scaled Book-Tax Differences

In Table A4, Panel B, the results of columns (1) through (4) suggest that *BTD/A* is useful in identifying cross-sectional variation in the pricing of pretax accruals and cash flows. Specifically, pre-tax accrual (*PTACC*) mispricing varies across the three groups, and pre-tax cash flow mispricing is significant only for large BTDs, both positive and negative. My findings are consistent with large BTDs leading to less persistent accruals and hence greater evidence of predictable returns with respect to accruals. Interestingly, with respect to pretax cash flows (*PTCF*), the results are somewhat counterintuitive. When firms have large temporary BTDs, pretax cash flows are less persistent. If functional fixation is descriptive, the positive coefficient on *PTCF* in the main sample should be reduced when cash flows are less persistent. However, the results suggest the opposite. When cash flows are the least persistent, they are the most strongly, positively associated with average future returns.

Next, in columns (5) through (8), I add a control for the value-glamour proxy, *CFO/P*. The results are similar to those in Panel A. Specifically, for the full sample as well as the *LNBTD*, *SmallBTD*, and *LPBTD* subsamples the coefficients on *PTACC* and *PTCF* are each statistically insignificant. I also document evidence of a statistically significant coefficient attenuation on *PTACC* and *PTCF*. This evidence is consistent with the value-glamour explaining BTD-related return predictability, and not with an overlap between the two. Additionally, these results corroborate the evidence of Desai et al. (2004) by demonstrating that value-glamour mispricing, identifiable using *CFO/P*, subsumes not only accrual mispricing on average (as seen from the full sample results, comparing columns (1) and (5)), but also any variation in accrual mispricing identifiable through variation in BTDs.

CHAPTER 5. PORTFOLIO CONSTRUCTION AND HEDGE PORTFOLIO TESTS

I construct portfolios by sorting firm-year observations based on realized values of the variables of interest: *TI/BI*, *TEMP/BI*, *PERM/BI*, *BTD/A* and *CFO/P*. Portfolio assignment occurs at the time when financial statement data become available based on breakpoints computed at a fixed point in time from observable annual data. I construct a short (long) portfolio, which comprises roughly the lower (upper) quintile of securities where investors are *ex-ante* predicted to exhibit the greatest overweighting (underweighting) of information in BTDs for future earnings.[30] By overweighting (underweighting) the information in BTDs, the short (long) portfolio is expected to generate negative (positive) returns. I examine the returns of the individual portfolios, and I examine whether investors can generate positive returns to a zero-investment hedge portfolio (long minus short).[31] After inspecting the returns to these portfolios, I then conduct two-way, independent sorts on one of each of the book-tax difference variables and on the value-glamour dimension (*CFO/P*). In Section 6, I use these one-way- and two-way-sorted portfolios in time-series multi-factor time-series asset pricing tests.

I begin by forming portfolios along each of the book-tax differences variables. First, *TI/BI* portfolios, *TEMP/BI* portfolios, and *PERM/BI* portfolios, respectively, are created by

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[30] I use three bins for each dimension to ease interpretation when I move to independent sorts on two dimensions (e.g., *BTD/A* × *CFO/P*). The extreme portfolios contain approximately 20 percent of observations each month, whereas the middle portfolio contains the remaining 60 percent each month. By limiting to three portfolios per dimension, a two-way sort results in nine separate portfolios and six control hedge portfolios. If instead I used deciles, as is sometimes common, this would result in 100 portfolios and 20 control hedge portfolios. Such a sorting would drastically reduce the number of firm-month returns in each portfolio, leading to increased standard errors as well as periods in which portfolios contained no observations. A similar approach is employed by Desai et al. (2004).

[31] Hedge portfolios are constructed to imply zero net investment. In practice, this assumption may be violated. Additionally, I cannot assume such hedge strategies are free of risk. As Shleifer and Vishny (1997) point out, arbitrage in practice is risky and entails capital.

sorting firms into three groups based on breakpoints at the 20th and 80th percentiles. The lower (upper) quintile represents the short (long) portfolios. Second, the results of Hanlon (2005) suggest that, for the *BTD/A* metric, the values of pre-tax accruals and pre-tax cash flows must also be considered to identify the greatest mispricing. First, I sort firm-years into three groups based on their values of *BTD/A* relative to annual breakpoints at the 20th and 80th percentile (i.e., *LNBTD*, *SmallBTD*, and *LPBTD*). Second, I independently sort firm-years into ten *PTACC* deciles. I repeat this construction of deciles for *PTCF*. The resultant short (long) portfolios comprise securities where the information in book-tax differences suggests the greatest extent of over- (under-) weighting of accrual and cash flow persistence.

Hanlon (2005) provides evidence using Nonlinear GLS (Mishkin 1983) tests that the market's mispricing of pre-tax accruals (*PTACC*) decreases as one moves from the large negative BTD bin to the large positive BTD bin. Likewise, the evidence suggests that the market's mispricing of pre-tax cash flows (*PTCF*) decreases monotonically as one moves across the same bins. I use this information in the construction of my three BTD portfolios. That is, BTD portfolios do not represent a one-dimensional sorting on the book-tax difference variable alone (i.e., *BTD/A*).

To achieve a partitioning into three BTD portfolios, I conduct three annual independent sorts on each of *BTD/A*, *PTACC*, and *PTCF*. Each year, I sort firms into three *BTD/A* bins—values below the 20th percentile represent the lowest and most negative values (i.e., large negative BTD or "*LNBTD*"), between the 20th and 80th percentiles represent the intermediate values (i.e., small BTD or "*SmallBTD*"), and above the 80th percentile represent the highest and most positive values (i.e., large positive BTD or

"*LPBTD*"). Next, I independently sort firms annually into deciles based on *PTACC* and again on *PTCF*.

For firm-years with low *PTACC* and *LNBTD*, low *PTACC* and *SmallBTD*, high *PTCF* and *LPBTD*, or high *PTCF* and *SmallBTD*, I classify these observations as "buy." For firm-years with high *PTACC* and *LNBTD*, high *PTACC* and *SmallBTD*, low *PTCF* and *LPBTD*, or low *PTCF* and *SmallBTD*, I classify these observations as "sell." Hence, there are two two-way sorts—one on BTDs and pretax accruals and another on BTDs and pretax cash flows. If at least one of those two-way sorts indicates "buy" ("sell"), I add this to the long (short) portfolio (denoted "*BTD/A5*" ("*BTD/A1*")). In the atypical case (about 1 in 600 observations) where the signal disagrees across the two two-way sorts (i.e., "buy" in one and "sell" in another), I map that firm-year to the intermediate portfolio (denoted "*BTD/A2-4*"). If both sorts indicate neither "buy" nor "sell," these firm-year observations are assigned to *BTD/A2-4*. Refer to Figure B1 below for a visual representation. All sorting is based on breakpoints that are estimated once each year using firms from the sample and including those firm-years with tax-loss carryforwards.[32] To ensure that the strategy is feasible, I calculate breakpoints from observable data prior to the return measurement windows. This ensures that any measured differences in returns between the groups (e.g., *BTD/A5* and *BTD/A1*) represent actual return differences from an implementable trading strategy (e.g., Lakonishok et al. 1994).[33]

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[32] Primary results are not sensitive to the exclusion of firm-years with tax-loss carryforwards in the formation of decile breakpoints.

[33] Results from all tests are robust to defining the long and short BTD portfolios in a variety of ways that attempt to isolate differential persistence implications of large *BTD/A*: (1) long low accruals and large BTDs, short high accruals and large BTDs; (2) long high cash flows and large BTDs, short low cash flow and large BTDs; (3) long low accruals in *LPBTD*, short high accruals in *LPBTD*; and (4) long low accruals in *LPBTD* plus high cash flows in *LNBTD*, short high accruals in *LPBTD* plus low cash flows in *LNBTD*. I side with the current construction because it follows from Hanlon (2005) and provides quasi-out-of-sample evidence, at least for 2001-2013, of the pricing effects attributable to *BTD/A*.

While I split *PTACC* and *PTCF* into deciles, the resultant portfolios represent an assignment of firm-years to *BTD/A* portfolios of roughly 20% to the short portfolio and 20% to the long portfolio. This focus on the observations in the extreme quintiles of the variable of interest is consistent with portfolio assignments for value-glamour. Firm years classified as neither short nor long based on the variable of interest are assigned to a middle portfolio of roughly 60% of firm-year observations. This setup ensures that for two-way sorts each of the nine portfolios (i.e., three times three) will be adequately populated to address concerns of high standard errors due to under-populated portfolios (Desai et al. 2004).

Next, I conduct independent annual sorts based on the value-glamour proxy (*CFO/P*). As with *TI/BI*, I use the quintile cut-off points to assign firms to three value-glamour portfolios, grouping the three intermediate quintiles (middle 60% of observations) into one portfolio. Hence, *CFO/P1* denotes the value portfolio, which is comprised of those observations with *CFO/P* values at or below the breakpoint for the 20th percentile. A short position is taken on this portfolio. The securities in this portfolio have extremely *high* growth expectations. If investors over-extrapolate realized growth in their expectations of future growth, this portfolio generates predictably negative returns as extreme growth reverts to the mean and investors' growth expectations prove too pessimistic. *CFO/P5* represents the glamour portfolio, which is comprised of those observations with *CFO/P* values above the breakpoint for the 80th percentile. A long position is taken on this portfolio. The securities in this portfolio have extremely *weak* growth expectations. If investors over-extrapolate realized growth in their expectations of future growth, this portfolio generates predictably positive returns as extreme growth reverts to the mean and investors' expectations prove too optimistic. Remaining observations comprise the intermediate portfolio, *CFO/P2-4*.

To ensure the strategy is feasible, I estimate breakpoints based on observable data prior to the return measurement window. This approach ensures that any measured differences in returns between portfolios represent actual differences in returns to an implementable trading strategy (e.g., Lakonishok et al. 1994). The breakpoints generated from these data are assumed to be observable when all annual 10-K are available (i.e., as of March 31, year *t*). These breakpoints can then be used to assign firm-years to portfolios for trading that occurs from April 1, year *t*, through March 31, year *t* + 1. For non-calendar year-end firms, portfolio assignment is based on the most recently estimated breakpoints. Then, when breakpoints are re-computed and available (i.e., the next March 31), those firm-years are reassigned accordingly. Figure B2 illustrates when data are collected to compute breakpoints and when those breakpoints are available to assign firm-years to portfolios.

I provide a brief example of how portfolio assignment works for a firm that does not have a calendar year-end. Assume Firm A releases its 10-K at the end of June of year *t*. At this point, portfolio assignment is based on the already calculated breakpoints for each variable, which are presumed to have been available as of April 1 of year *t* and to remain in place for Firm A from July 1 of year *t* through March 31 of year *t* + 1. For monthly returns of Firm A occurring between April 1 of year *t* + 1 and June 30 of year *t* + 1, Firm A will be assigned to portfolios based on newly available breakpoints (for year *t* + 1) relative to the 10-K data from Firm A's year *t* filing. All portfolios are rebalanced monthly to account for firms that change portfolios because of the release of new 10-Ks as well as other entries and exits from the sample (e.g., due to delisting).[34]

Returns to the one-way-sorted portfolios provide preliminary evidence of the viability of a trading strategy based strictly on each of the dimensions examined. Table A5 presents descriptive evidence based on the mean monthly returns across all periods for each portfolio and for the component securities that comprise each portfolio. Mean returns in Table A5 using the Lev and Nissim (2004) and Chi et al. (2014) measures of book-tax differences do not display the anticipated monotonic trend across the portfolios. Additionally, hedge returns are insignificant both statistically and economically. The Sharpe ratios for the hedge portfolios based on *TI/BI*, *TEMP/BI*, and *PERM/BI* confirm this finding. While not necessarily definitive, these results call into question the usefulness of income-scaled measures of book-tax differences as a signal of mispricing.

For the *BTD/A* and *CFO/P* portfolios, the difference in mean returns between portfolio 5 ("buy") and portfolio 1 ("sell") is positive and statistically significant. The difference in means for portfolio excess returns for *BTD/A* (*CFO/P*) is economically significant: 50.3 (91.3) basis points per month on an equal-weighted basis and 73.5 (81.4) basis points per month on a value-weighted basis. Moreover, moving from portfolio 1 to portfolio 5, there appears to be a monotonic relation, which suggests that sorting on these dimensions potentially provides information that is relevant for predicting future returns. The Sharpe ratio of the hedge portfolio based on the *BTD/A* (*CFO/P*) sorting strategy is 0.71 (0.85), which nearly (slightly greater than) double the market portfolio Sharpe ratio of 0.42 for the same period. The magnitudes of these Sharpe ratios suggest mispricing

[34] Results are qualitatively unaffected when the sample is restricted to calendar year-end firm-years.

under the null hypothesis of market efficiency. Moreover, these ratios are in line with Sharpe ratios documented in the literature for trading strategies designed to capture the mispricing of accruals (e.g., Mashruwala et al. 2006).

CHAPTER 6. ASSET PRICING TESTS

I now turn to time-series analysis of the portfolio returns using conventional multi-factor asset pricing models. This analysis uses portfolio returns to the one-way and two-way sorts described above. I regress monthly portfolio returns on market returns and typical risk factors. I test three models (e.g., Fama-French (1993) three-factor model, Fama-French three-factor model augmented with the momentum factor (Carhart 1997), and the Fama-French (2015) five-factor model). Specifically, I estimate the factor models reflected in Equations (3.1) through (3.3):

$$\left(R_p - R_f\right)_t = \alpha + \beta_{RMRF}\left(R_M - R_f\right)_t + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \varepsilon_t \quad (3.1)$$

$$\left(R_p - R_f\right)_t = \alpha + \beta_{RMRF}\left(R_M - R_f\right)_t + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{UMD}UMD_t + \varepsilon_t \quad (3.2)$$

$$\left(R_p - R_f\right)_t = \alpha + \beta_{RMRF}\left(R_M - R_f\right)_t + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{CMA}CMA_t + \beta_{RMW}RMW_t + \varepsilon_t \quad (3.3)$$

where $R_m - R_f$ represents market returns to the CRSP index (either equal- or value-weighted depending on the portfolio weightings) in excess of the risk-free rate, *SMB* (small minus big size) represents the market capitalization factor-mimicking returns, *HML* (high minus low BE/ME) represents the book equity to market equity factor-mimicking returns, *UMD* (up minus down momentum) is the returns to a portfolio buying past recent winners and selling past recent losers, *CMA* (conservative minus aggressive investment) is the factor-mimicking return to investment (i.e., nominal asset growth), and *RMW* (robust minus weak) is the factor-mimicking return to accruals. I estimate Equations (3.1) through (3.3) and test for significant pricing errors (or alphas). If the factor models explain return behavior, then the estimated intercepts should be individually and jointly zero (Gibbons et al. 1989).

Table A6 presents the results of estimating Equations (3.1) through (3.3) using the one-way-sorted portfolios as test assets. In Panel A, I provide additional evidence in support of BTD mispricing. In all three time-series tests, I observe significant positive abnormal alpha to *BTD/A5* (long portfolio) and significant negative alpha to *BTD/A1* (short portfolio). A zero-investment, hedge strategy that goes long on *BTD/A5* and short on *BTD/A1* generates abnormal returns in excess of 60 basis points per month, a finding that is statistically significant at the one-percent level (two-tailed) as well as economically significant. Moreover, focusing on the Fama-French five-factor model (Eq. 3.3), the Gibbons et al. (1989) ("GRS") *F*-test of the *BTD/A* portfolio alphas suggests rejection of the null hypothesis, namely that the portfolios pricing errors are jointly zero, at the one-percent level for both value- and equal-weighted returns (untabulated).

Panel B, Table A6, presents the results for portfolios sorted on *TI/BI*. For each of the models, I find that the hedge portfolios generate significant, positive abnormal returns when equal-weighted returns are used. However, the opposite is true for value-weighted returns—none of the alphas are statistically significant. Focusing on the equal-weighted returns, the pricing errors moving from the sell portfolio to the buy portfolio increase monotonically, though they are not always significant. More compellingly, the hedge portfolio pricing errors are statistically significant at the 10-percent (two-tailed) level or better. Using the five-factor model, I observe an abnormal return of 22.2 basis points per month, significant at the five-percent level (two-tailed). With respect to the alphas from the Fama-French five-factor model (Eq. 3.3), the GRS *F*-test rejects the null hypothesis ($p < 0.05$) that the individual portfolio alphas are jointly zero for equal-weighted returns tests. The evidence suggest that *TI/BI* is mispriced, but it may be mispriced due to limits to arbitrage, such as transaction costs or short-selling constraints, as the Sharpe ratios are below the market portfolio for the same time period.

Panel C of Table A6 presents the results for portfolios sorted on *TEMP/BI*. The results are similar to those of Panel B, which is consistent with the finding from Chi et al. (2014) that much of the ability of *TI/BI* to explain future returns comes from the temporary portion. Focusing on Eq. (3.3), the GRS *F*-Test of alphas from the equal-weighted returns test is statistically significantly different from zero at the five-percent level (untabulated). Again, these results should be viewed with caution, since unlike the trading strategy using *BTD/A*, the economic significance dampens the statistically significant evidence and further contributes to the lack of evidence in support of mispricing. Panel D of Table A6 provides the results for portfolios sorted on *PERM/BI*. Here, we observe no evidence of mispricing. Moreover, the GRS *F*-Tests for all of the equations using both equal- and value-weighted returns fail to reject the null that the alphas are jointly equal to zero. This is consistent with the claims of Chi et al. (2014). For this reason, and given the evidence from tests in Tables A4 and A5, I remove *PERM/BI* from the remainder of my analysis.

As for *CFO/P* portfolios, Panel E shows a similar pattern to that of *BTD/A* portfolios. I find that the abnormal returns to the adjusted five-factor model are about 50.3 (69.7) basis points per month using equal-weighted (value-weighted) returns. The GRS *F*-test rejects the null at the one-percent level using both equal- and value-weighted returns (untabulated). This finding confirms that *CFO/P* identifies an economically meaningful degree of mispricing even within the restrictive sample I require to compute the book-tax difference measures.

Table A7 presents the results of estimating Equations (3.1) through (3.3) using the double-sorted portfolios as test assets. Panel A (B) provides tests for mispricing based on asset pricing errors for portfolios based on two-way sorts of *BTD/A* and *CFO/P*. The evidence is consistent across all three specifications. Namely, the value-glamour hedge portfolios, controlling for *BTD/A*, generate significant pricing errors in at least one portfolio across all three models. By contrast, *BTD/A* hedge portfolios, controlling for *CFO/P*, fail to generate significant pricing errors in all control hedge portfolios. To provide additional statistical evidence, I calculate the GRS *F*-statistic for the hedge-control portfolio alphas from Eq. (3.3) (untabulated). I fail to reject the null that the pricing errors are jointly zero for the *BTD/A* hedge control portfolios (i.e., controlling for *CFO/P*), but I reject the null at one-percent level or better for the *CFO/P* hedge portfolios (controlling for *BTD/A*). This supports the conclusion that the value-glamour (*CFO/P*) anomaly subsumes any plausible book-tax differences (*BTD/A*) pricing anomaly.

Next, I examine the asset pricing errors from a two-way sort on *TI/BI* and *CFO/P*. Panel C (Panel D) of Table A7 reports the results using equal-weighted (value-weighted) returns. Focusing on Panel C, I find that in all tests the value-glamour hedge portfolios earn significant positive abnormal returns after controlling for *TI/BI* portfolios. However, across all three specifications, only one of nine of the *TI/BI* hedge portfolios earn significant, positive abnormal returns within value-glamour portfolios. These control hedge results suggest that there is substantial overlap for a *CFO/P* trading strategy, relative to a *TI/BI* trading strategy. However, hedge returns to a *TI/BI* trading strategy are subsumed by the *CFO/P* anomaly. To provide further evidence, I conduct a GRS *F*-test of the respective hedge control portfolio alphas from Eq. (3.3). I fail to reject the null that the pricing errors are jointly zero for the *TI/BI* hedge control portfolios (i.e., controlling for *CFO/P*), but I reject the null at one-percent level or better for the *CFO/P* hedge portfolios (controlling for *TI/BI*). Specifically, *CFO/P* exhibits abnormal returns after controlling for *TI/BI*, but the *TI/BI* mispricing previously documented in Table A6, Panel B, is now subsumed by *CFO/P*.

Lastly, I examine the asset pricing errors form a two-way sort on *TEMP/BI* and *CFO/P*. The results presented in Panel E (Panel F) is largely consistent with those results provided in Panel C (Panel D) for *TI/BI*. This is consistent with the notion that much of ability of *TI/BI* to explain returns derives from the temporary portion of total book-tax differences and not the permanent portion. Furthermore, the GRS *F*-test fails to reject the null that the alphas are jointly zero for the *TEMP/BI* hedge control portfolios, whereas I reject the null at the one percent level for the *CFO/P* hedge control portfolios (untabulated). Across 18 asset pricing errors, I only document only two that are positive and statistically significant for the *TEMP/BI* hedge control portfolios. By contrast, all of the *CFO/P* hedge control portfolio alphas are positive and statistically significant. This again is consistent with value-glamour (*CFO/P*) mispricing subsuming the mispricing attributable to book-tax differences (*BTD/A*). Putting this evidence together with the evidence from the Fama-MacBeth monthly cross-sectional returns tests, the evidence suggests that book-tax differences capture the value-glamour anomaly with error. This conclusion makes sense in light of the low correlation between anomaly returns (e.g., Green, Hand, and Zhang 2014).

CHAPTER 7. CONCLUSION

In this study, I examine whether book-tax differences are mispriced. Prior research documents consistent evidence of a link between book-tax differences and future earnings. However, the evidence of an association with future returns has been mixed. I conduct a series of tests to determine whether such pricing relations obtain and whether they appear to be the outcome of mispricing or an omitted risk factor that is priced.

The results from cross-sectional return predictability tests provide consistent statistical evidence that book-tax differences are related to average future monthly returns. However, not all results are economically significant. For example, total and temporary BTDs generate returns of 2.7 percent and 1.5 percent per annum, respectively. I further this evidence by developing portfolios that trade on the information in book-tax differences. Time-series asset pricing tests provide new evidence that favors a mispricing-based explanation for the return patterns related to BTDs.

I assert that book-tax differences are related to growth and test whether the pricing of BTDs relates to growth mispricing (i.e., the value-glamour anomaly). I find the returns to the value-glamour anomaly subsume those to book-tax differences. My findings support claims that BTDs are mispriced but suggest that trading on the information in BTDs does not yield returns incremental to those of the value-glamour anomaly. This provides evidence of a parsimonious mispricing signal that jointly explains BTD-based mispricing and value-glamour mispricing. Moreover, Graham et al. (2014, p. 431) assert, "…it is not clear whether the observed [BTD] pricing behavior relates to the market's attempts to actually price taxable income or whether the market is merely pricing a component of the income statement." My results suggest that such an alternate component may come from the cash flow statement, not the income statement, and investors' expectations of growth in operating cash flows.

APPENDIX A. TABLES

Table A1. Sample Selection

	Number of observations
Merged Compustat/CRSP firm-years with available data to measure variables in cross-sectional regressions	73,816
Delete members of SIC codes for Utilities (4900-4999) and Financial Services (6000-6999)	(4,786)
Delete firm-years with negative pre-tax income (PI < 0)	(25,910)
Final sample of firm-years	**43,120**
Final sample of firm-months	508,300
Number of unique firms	6,566

Note: This table summarizes the sample selection procedure for this study. All variables are defined in Appendix C. The return measurement window begins in the fourth month after the fiscal year and extends through the end of the third month of the next fiscal year. Per firm-year, there are roughly 11.8 firm-months. This feature of the data can be explained by delistings. In months where the delisting occurs in the middle of the month, the partial month return is compounded with the delisting return, and the post-delisting proceeds are reinvested in the same size-decile portfolio as the delisted security for the remainder of the month. After the delisting month, the size-decile portfolio investment is kept until the end of that firm-year's return accumulation window.

Table A2. Descriptive Statistics

	Full Sample			Means			Diff.	Means			Diff.	Means			Diff.	Means			Diff.
	Mean	Std. Dev.	Median	BTD/A1	BTD/A2-4	BTD/A5	5 - 1	TI/BI1	TI/BI2-4	TI/BI5	5 - 1	TEMP/BI1	TEMP/BI2-4	TEMP/BI5	5 - 1	PERM/BI1	PERM/BI2-4	PERM/BI5	5 - 1
BTD/A	0.005	0.047	0.002	-0.001	0.004	0.006	***	0.014	0.008	-0.018	***	-0.040	0.006	0.044	***	0.016	0.007	-0.014	***
TI/BI	0.733	0.960	0.752	0.572	0.725	0.919	***	-0.071	0.754	1.729	***	1.210	0.717	0.310	***	1.088	0.764	0.296	***
TEMP/BI	0.060	0.779	0.017	0.090	0.097	-0.105	***	0.343	0.099	-0.416	***	-0.698	0.067	0.777	***	0.212	0.078	-0.142	***
PERM/BI	0.274	1.749	0.080	0.438	0.238	0.248	***	0.859	0.163	-0.195	***	0.569	0.249	0.046	***	-0.955	0.154	1.826	***
CFO/P	-2.475	0.908	-2.417	-3.416	-2.442	-2.117	***	-2.393	-2.509	-2.482	***	-2.495	-2.534	-2.311	***	-2.388	-2.505	-2.484	***
BETA	1.093	0.765	0.994	1.236	1.053	1.112	***	1.170	1.059	1.086	***	1.133	1.081	1.083	***	1.092	1.052	1.200	***
SIZE	6.022	2.051	6.021	5.161	6.200	6.185	***	5.390	6.329	6.019	***	5.905	6.154	5.818	***	5.771	6.277	5.631	***
BTM	-0.835	0.740	-0.786	-0.722	-0.785	-1.130	***	-0.729	-0.901	-0.794	***	-0.785	-0.928	-0.660	***	-0.734	-0.899	-0.775	***
EP	-2.470	0.818	-2.383	-2.615	-2.418	-2.529	***	-2.591	-2.417	-2.461	***	-2.576	-2.464	-2.381	***	-2.409	-2.427	-2.647	***
CP	-2.106	0.845	-2.045	-2.346	-2.041	-2.125	***	-2.162	-2.093	-2.070	***	-2.153	-2.151	-1.952	***	-2.005	-2.100	-2.226	***
SALES_GROWTH	0.201	0.361	0.115	0.311	0.169	0.214	***	0.215	0.194	0.201	***	0.204	0.207	0.182	***	0.207	0.195	0.210	
BHRET6	0.100	0.361	0.065	0.072	0.097	0.140	***	0.111	0.097	0.097	**	0.101	0.105	0.088	**	0.099	0.097	0.109	*
BHRET36	0.694	1.431	0.318	0.724	0.626	0.918	***	0.599	0.763	0.629		0.645	0.781	0.531	***	0.618	0.759	0.604	
PTACC	-0.026	0.084	-0.034	0.091	-0.033	-0.109	***	-0.021	-0.023	-0.039	***	-0.038	-0.020	-0.027	***	-0.032	-0.024	-0.024	***
PTCF	0.142	0.109	0.131	0.020	0.136	0.277	***	0.104	0.158	0.145	***	0.130	0.156	0.117	***	0.129	0.159	0.109	***
LN_ISSUE	0.027	0.098	0.005	0.049	0.023	0.019	***	0.039	0.021	0.026	***	0.031	0.025	0.027	***	0.030	0.020	0.039	***
I(M&A=1)	0.202	0.402	0.000	0.197	0.214	0.163	***	0.165	0.214	0.219	***	0.204	0.202	0.200		0.216	0.203	0.185	***

Note: The above statistics are presented for the sample of 43,120 firm-year observations for the annual variables (e.g., the four BTD variables, *CFO/P*, *BTM*, *EP*, *CP*, *SALES_GROWTH*, *PTACC*, *PTCF*, and *I(M&A=1)*) and for the sample of 508,300 firm-months observations for the remaining variables, which can be measured on a monthly basis. All observable inputs to return predictability tests are winsorized at the 1st and 99th percentile based on data available at the time of portfolio formation. Variables based on future returns are not winsorized. *I(M&A=1)* is an indicator variable that takes the value of 1 if a firm-year experiences M&A during the fiscal year, and 0 otherwise. All other variables are measured as defined in Appendix C. I present the mean, standard deviation, and median for the full sample. I then present means for the portfolios sorted based on each book-tax difference variable, *BTD/A*, *TI/BI*, *TEMP/BI*, and *PERM/BI*, respectively. For each portfolio sort, I test the difference between the fifth portfolio (or long portfolio) and the first portfolio (or short portfolio). Testing the difference in means, *** (**) [*] indicates a two-tailed *p*-value less than 1% (5%) [10%].

Table A3. Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) BTD/A		***-0.232***	***0.511***	***-0.112***	***0.127***	***-0.072***	***0.023***	***0.061***	***0.123***	***0.127***	***-0.034***	-0.005	***-0.039***	***0.020***	-0.003	***-0.024***
(2) TI/BI	***-0.435***		***-0.520***	***-0.322***	***-0.043***	***-0.031***	***0.045***	***-0.029***	***0.029***	***0.019***	***0.017***	***-0.017***	0.006	***-0.042***	***0.076***	**-0.012**
(3) TEMP/BI	***0.904***	***-0.463***		***-0.120***	***0.098***	***-0.045***	0.006	***0.057***	***0.102***	***0.108***	***-0.016***	0.002	***-0.020***	***0.020***	**-0.012**	***-0.013***
(4) PERM/BI	***-0.221***	***-0.435***	***-0.236***		***-0.025***	***0.059***	***-0.016***	-0.005	***-0.066***	***-0.052***	-0.006	***0.013***	**-0.010**	0.002	***-0.063***	***0.037***
(5) CFO/P	***0.151***	***-0.084***	***0.159***	***-0.068***		***-0.144***	***-0.144***	***0.474***	***0.601***	***0.695***	***-0.258***	***-0.033***	***-0.244***	***-0.539***	***0.209***	***-0.173***
(6) BETA	***-0.075***	***-0.057***	***-0.072***	***0.083***	***-0.136***		***0.099***	***-0.112***	***-0.186***	***-0.192***	***0.104***	***0.029***	***0.093***	***0.050***	***-0.031***	***0.068***
(7) SIZE	***0.038***	***0.087***	***0.023***	**0.011**	***-0.167***	***0.123***		-0.450	-0.131	-0.167	-0.028	0.028	0.124	-0.146	0.236	-0.059
(8) BTM	***0.071***	***-0.061***	***0.097***	***-0.042***	***0.506***	***-0.105***	***-0.450***		***0.432***	***0.523***	***-0.207***	***-0.122***	***-0.365***	***-0.015***	***-0.362***	***-0.080***
(9) EP	***0.136***	***0.074***	***0.134***	***-0.159***	***0.637***	***-0.161***	***-0.162***	***0.460***		***0.910***	***-0.161***	***-0.083***	***-0.182***	***-0.026***	***0.059***	***-0.142***
(10) CP	***0.150***	***0.020***	***0.160***	***-0.143***	***0.744***	***-0.171***	***-0.202***	***0.571***	***0.918***		***-0.204***	***-0.083***	***-0.242***	***-0.151***	***0.017***	***-0.134***
(11) SALES_GROWTH	***-0.045***	***0.030***	***-0.045***	***-0.021***	***-0.288***	***0.109***	-0.003	***-0.272***	***-0.155***	***-0.210***		***0.009***	***0.222***	***0.202***	***-0.020***	***0.329***
(12) BHRET6	0.007	***-0.013***	0.005	**0.012**	***-0.018***	0.008	***0.091***	***-0.119***	***-0.062***	***-0.064***	-0.004		***0.353***	***-0.048***	***0.062***	***0.052***
(13) BHRET36	***-0.015***	***0.049***	***-0.031***	-0.005	***-0.257***	**0.011**	***0.224***	***-0.418***	***-0.183***	***-0.254***	***0.275***	***0.384***		***0.072***	***0.169***	***0.169***
(14) PTACC	***0.015***	***-0.019***	0.009	***0.014***	***-0.553***	***0.039***	***-0.132***	-0.006	***-0.014***	***-0.142***	***0.193***	***-0.073***	***0.059***		***-0.597***	***0.113***
(15) PTCF	**-0.012**	***0.180***	***-0.047***	***-0.083***	***0.210***	***-0.038***	***0.249***	***-0.375***	**0.012**	***-0.039***	***0.036***	***0.080***	***0.211***	***-0.576***		***-0.116***
(16) LN_ISSUE	***-0.029***	***-0.066***	***-0.021***	***0.040***	***-0.192***	***0.134***	***-0.080***	***-0.113***	***-0.187***	***-0.179***	***0.316***	***0.053***	***0.210***	***0.100***	***-0.114***	

Note: Pearson product-moment (Spearman rank) correlation coefficients are presented above (below) the diagonal. All variables are defined in Appendix C. ***Bold-italics*** (**bold**) indicates a *p*-value of less than 0.01 (0.05).

Table A4. Fama-MacBeth Cross-Sectional Return Predictability Regressions

Panel A. Total, Temporary, and Permanent Book-Tax Differences

	(1) Ri-Rf	(2) Ri-Rf	(3) Ri-Rf	(4) Ri-Rf	(5) Ri-Rf	(6) Ri-Rf
TI/BI	0.154**			0.106		
	(2.157)			(1.519)†		
TEMP/BI		-0.077			0.060	
		(-1.201)			(0.968)†††	
PERM/BI			0.018			-0.013
			(0.254)			(-0.175)††
CFO/P				0.498***	0.369**	0.353**
				(2.888)	(2.121)	(2.071)
BETA	0.225	0.219	0.223	0.214	0.226	0.228
	(0.727)	(0.710)	(0.721)	(0.673)	(0.732)	(0.740)
SIZE	-0.554*	-0.545*	-0.537*	-0.529	-0.546*	-0.540*
	(-1.752)	(-1.715)	(-1.710)	(-1.630)	(-1.726)	(-1.725)
BTM	0.046	0.054	0.053	0.025	0.003	0.006
	(0.349)	(0.409)	(0.404)	(0.184)	(0.024)	(0.043)
EP	-0.478*	-0.474*	-0.475*	-0.565**	-0.490*	-0.490*
	(-1.813)	(-1.771)	(-1.797)	(-2.066)	(-1.833)	(-1.857)
CP	0.622*	0.629*	0.620*	0.448	0.440	0.436
	(1.717)	(1.745)	(1.715)	(1.222)	(1.213)	(1.206)
SALES_GROWTH	-0.329**	-0.334**	-0.329**	-0.310**	-0.319**	-0.313**
	(-2.459)	(-2.508)	(-2.472)	(-2.313)	(-2.381)	(-2.346)
BHRET6	0.139	0.148	0.143	0.152	0.136	0.132
	(0.543)	(0.577)	(0.558)	(0.583)	(0.529)	(0.515)
BHRET36	-0.157	-0.164	-0.160	-0.174	-0.163	-0.160
	(-0.654)	(-0.682)	(-0.669)	(-0.708)	(-0.678)	(-0.669)
PTACC	-0.257**	-0.246**	-0.249**	-0.060	-0.081	-0.092
	(-2.412)	(-2.299)	(-2.321)	(-0.518)	(-0.632)	(-0.735)
PTCF	0.389**	0.423**	0.412**	0.296*	0.361**	0.351**
	(2.260)	(2.491)	(2.410)	(1.723)	(2.093)	(2.022)
LN_ISSUE	-0.318**	-0.322**	-0.323**	-0.384**	-0.318**	-0.319**
	(-2.420)	(-2.443)	(-2.451)	(-2.574)	(-2.413)	(-2.421)
Intercept	1.062**	1.117**	1.098**	0.790	1.017*	0.999*
	(2.035)	(2.128)	(2.146)	(1.582)	(1.922)	(1.935)
Guenther (2011) Controls	Y	Y	Y	Y	Y	Y
N (months)	237	237	237	237	237	237
N (firm-months)	508,300	508,300	508,300	508,300	508,300	508,300
Ave. R-Squared	0.048	0.048	0.048	0.045	0.048	0.048

Table A4—continued

Panel B. Predictive Ability of Pretax Accruals and Pretax Cash Flows, Conditional on BTD/A

	(1) Full Ri-Rf	(2) LNBTD Ri-Rf	(3) SmallBTD Ri-Rf	(4) LPBTD Ri-Rf	(5) Full Ri-Rf	(6) LNBTD Ri-Rf	(7) SmallBTD Ri-Rf	(8) LPBTD Ri-Rf
PTACC	-0.307***	-0.337*	-0.140	-0.426**	-0.128	-0.201	-0.008	-0.213
	(-2.682)	(-1.693)	(-0.712)	(-2.003)	(-0.987)	(-0.855)††	(-0.045)†	(-0.916)††
PTCF	0.400**	0.536**	0.121	0.494*	0.335*	0.023	0.125	0.253
	(2.344)	(2.060)	(0.631)	(1.784)	(1.931)	(0.072)†††	(0.689)	(0.673)††
CFO/P					0.390**	0.560**	0.641***	0.559*
					(2.301)	(2.323)	(3.299)	(1.794)
BETA	0.205	0.198	0.210	0.152	0.211	0.213	0.213	0.163
	(0.659)	(0.557)	(0.670)	(0.482)	(0.679)	(0.601)	(0.678)	(0.517)
SIZE	-0.548*	-0.203	-0.635*	-0.507	-0.550*	-0.207	-0.643**	-0.520
	(-1.726)	(-0.605)	(-1.968)	(-1.473)	(-1.735)	(-0.618)	(-1.997)	(-1.521)
BTM	0.074	0.272	-0.179	0.625**	0.020	0.282	-0.274*	0.572**
	(0.564)	(0.996)	(-1.205)	(2.583)	(0.147)	(0.969)	(-1.810)	(2.250)
EP	-0.486*	-0.779	-0.418	-0.273	-0.500*	-0.762	-0.465	-0.262
	(-1.783)	(-1.596)	(-1.463)	(-0.471)	(-1.835)	(-1.550)	(-1.609)	(-0.457)
CP	0.628*	1.021*	0.734**	-0.005	0.427	1.010*	0.450	-0.162
	(1.744)	(1.842)	(2.113)	(-0.007)	(1.179)	(1.795)	(1.266)	(-0.236)
SALES_GROWTH	-0.331**	-0.224	-0.418***	-0.260	-0.315**	-0.228	-0.388***	-0.246
	(-2.473)	(-1.109)	(-2.911)	(-1.188)	(-2.347)	(-1.133)	(-2.694)	(-1.123)
BHRET6	0.183	0.252	0.011	0.491	0.171	0.258	-0.006	0.485
	(0.704)	(0.792)	(0.041)	(1.482)	(0.657)	(0.814)	(-0.024)	(1.467)
BHRET36	-0.214	-0.143	-0.218	-0.210	-0.210	-0.154	-0.205	-0.222
	(-0.885)	(-0.537)	(-0.852)	(-0.699)	(-0.867)	(-0.574)	(-0.803)	(-0.744)
LN_ISSUE	-0.374***	-0.402*	-0.318**	-0.483***	-0.366***	-0.410*	-0.312**	-0.488***
	(-2.663)	(-1.891)	(-2.192)	(-2.732)	(-2.615)	(-1.925)	(-2.148)	(-2.753)
Intercept	0.946*	0.635	1.148**	0.630	0.836	0.643	0.947*	0.582
	(1.824)	(1.128)	(2.202)	(1.056)	(1.599)	(1.162)	(1.795)	(0.953)
Guenther (2011) Controls	Y	Y	Y	Y	Y	Y	Y	Y
N (months)	237	237	237	237	237	237	237	237
N (firm-months)	508,300	100,436	300,580	107,284	508,300	100,436	300,580	107,284
Ave. R-squared	0.046	0.050	0.049	0.053	0.047	0.050	0.050	0.054

Table A4—continued

Note: In panel A, I test whether total book-tax differences (*TI/BI*), temporary book-tax differences (*TEMP/BI*), and permanent book-tax differences (*PERM/BI*), respectively, are related to future returns. In panel B, I test the ability of pretax accruals (*PTACC*) and pretax cash flows (*PTCF*) to predict future returns, conditional on the temporary book-tax difference (*BTD/A*) group. In each panel, I present a reduced model without *CFO/P* and a full model with *CFO/P*. All variables as defined in Appendix C and are measured on a moving basis when not based on annual accounting data. If based on annual accounting data, inputs are assumed to be observable as of the beginning of the fourth month after the fiscal year-end. Independent variables represent decile-ranked scaled transformations. In parentheses, Fama-MacBeth (1973) *t*-statistics corrected for autocorrelation using the Newey-West (1987) procedure with truncation lag $L = 4$. Greene (2007) recommends setting L to the nearest integer such that $L \approx \sqrt[4]{T}$. In this panel, T equals 237 months. *** (**) [*] indicates a two-tailed *p*-value of less than 0.01 (0.05) [0.10]. ††† (††) [†] indicates a one-tailed *p*-value of less than 0.01 (0.05) [0.10] based on the Clogg et al. (1995) *t*-test for attenuation in slope coefficients, which compares the model without *CFO/P* (reduced model) to the model with *CFO/P* (full model).

Table A5. Average Monthly Excess Returns: One-Way Sorted Portfolios

Portfolio:	Short 1	2 - 4	Long 5	Hedge 5 - 1	Hedge Sharpe Ratio
BTD/A Portfolios:					
Equal-Weighted Returns	0.6401	0.9879	1.1435	0.5034	0.868
t-statistic	*1.45*	*2.89*	*3.14*	*3.78*	
Value-Weighted Returns	0.0659	0.7388	0.8010	0.7351	0.653
t-statistic	*0.14*	*2.64*	*2.25*	*2.85*	
TI/BI Portfolios:					
Equal-Weighted Returns	0.9328	0.9197	1.0590	0.1261	0.336
t-statistic	*2.43*	*2.62*	*2.90*	*1.46*	
Value-Weighted Returns	0.5831	0.7209	0.6800	0.0970	0.133
t-statistic	*1.52*	*2.53*	*1.96*	*0.58*	
TEMP/BI Portfolios:					
Equal-Weighted Returns	0.9330	0.9385	0.9981	0.0651	0.204
t-statistic	*2.54*	*2.66*	*2.67*	*0.89*	
Value-Weighted Returns	0.6189	0.7153	0.7497	0.1309	0.174
t-statistic	*1.79*	*2.47*	*2.20*	*0.76*	
PERM/BI Portfolios:					
Equal-Weighted Returns	0.9702	0.9152	1.0150	0.0447	0.142
t-statistic	*2.36*	*2.68*	*2.77*	*0.44*	
Value-Weighted Returns	0.5696	0.7359	0.6810	0.1114	0.101
t-statistic	*1.69*	*2.53*	*1.85*	*0.62*	
CFO/P Portfolio:					
Equal-Weighted Returns	0.4589	0.9911	1.3714	0.9125	0.884
t-statistic	*1.03*	*2.92*	*3.68*	*3.85*	
Value-Weighted Returns	0.2237	0.8213	1.0378	0.8141	0.557
t-statistic	*0.51*	*2.96*	*3.07*	*2.43*	

Note: This table presents average monthly portfolio returns, in excess of the risk-free rate. For each variable, *BTD/A*, *TI/BI*, *TEMP/BI*, *PERM/BI*, and *CFO/P*, portfolio 1 represents the short portfolio (or sell leg), and portfolio 5 represents the long portfolio (or buy leg). These portfolios are formed based on quintile breakpoints computed from observable inputs as of April 1 of each year (see Figure B2). Refer to Figure B1 for *BTD/A* portfolios formation. Annualized Sharpe ratios (SR) for portfolio p are estimated as follows:

$$SR(p) = t_p * \left(\frac{\sqrt{12}}{\sqrt{237}}\right) = \frac{\mu\left(R_p - R_f\right)}{\sigma\left(R_p - R_f\right)/\sqrt{237}} * \left(\frac{\sqrt{12}}{\sqrt{237}}\right) = \sqrt{12} * \frac{\mu\left(R_p - R_f\right)}{\sigma\left(R_p - R_f\right)}$$

Multiplying by $\sqrt{12}$ approximately annualizes the monthly Sharpe ratio (Lewellen 2010). There are 237 monthly return observations, spanning April 1995 through December 2014, which are paired with realized accounting and other data from fiscal years 1994 through 2013.

Table A6. Time-Series Asset Pricing Tests: One-Way Sorted Portfolios

Panel A. BTD/A Portfolios

	Equal-Weighted Returns				Value-Weighted Returns			
	(1) BTD/A1 (Short)	(2) BTD/A2-4	(3) BTD/A5 (Long)	(4) BTD/A5 less BTD/A1	(5) BTD/A1 (Short)	(6) BTD/A2-4	(7) BTD/A5 (Long)	(8) BTD/A5 less BTD/A1
Fama-French 3-Factor Model								
Intercept	-0.3799	0.1246	0.2901	0.6700	-0.8123	0.1522	0.2441	1.0564
t-statistics	*-3.65*	*1.35*	*3.01*	*6.16*	*-3.70*	*2.16*	*2.10*	*4.25*
β_{RMRF}	1.1435	0.9233	0.9408	-0.2027	1.3310	0.9330	1.0373	-0.2937
t-statistics	*42.41*	*28.10*	*29.91*	*-6.87*	*21.51*	*51.07*	*28.80*	*-4.56*
β_{SMB}	0.1028	0.0137	0.0768	-0.0260	0.3069	-0.1113	-0.1270	-0.4339
t-statistics	*1.71*	*0.20*	*1.21*	*-0.69*	*2.44*	*-1.83*	*-1.55*	*-4.80*
β_{HML}	-0.0325	0.2104	0.0424	0.0749	-0.2016	0.0296	-0.3795	-0.1779
t-statistics	*-0.83*	*5.27*	*1.03*	*1.80*	*-1.98*	*0.67*	*-5.55*	*-1.85*
Adj.R^2	95.3%	92.4%	91.9%	37.9%	83.0%	92.7%	84.0%	27.9%
Carhart 4-Factor Model								
Intercept	-0.3951	0.1004	0.2471	0.6422	-0.6481	0.2370	0.3238	0.9719
t-statistics	*-3.65*	*1.03*	*2.42*	*5.63*	*-3.17*	*2.82*	*2.60*	*3.87*
β_{RMRF}	1.1533	0.9388	0.9685	-0.1848	1.2431	0.8876	0.9946	-0.2485
t-statistics	*47.84*	*34.31*	*36.18*	*-7.02*	*21.13*	*40.62*	*27.23*	*-3.62*
β_{SMB}	0.0933	-0.0014	0.0500	-0.0433	0.3419	-0.0932	-0.1100	-0.4519
t-statistics	*1.63*	*-0.02*	*0.79*	*-1.04*	*3.16*	*-1.97*	*-1.54*	*-5.14*
β_{HML}	-0.0280	0.2176	0.0552	0.0832	-0.2688	-0.0052	-0.4121	-0.1433
t-statistics	*-0.70*	*5.49*	*1.28*	*1.90*	*-3.20*	*-0.18*	*-6.63*	*-1.57*
β_{UMD}	0.0161	0.0256	0.0455	0.0294	-0.2117	-0.1094	-0.1027	0.1090
t-statistics	*0.60*	*0.88*	*1.59*	*0.89*	*-3.13*	*-2.79*	*-1.83*	*2.05*
Adj.R^2	95.3%	92.4%	92.0%	38.0%	85.0%	94.2%	84.8%	29.4%
Fama-French 5-Factor Model								
Intercept	-0.4714	-0.0367	0.1636	0.6351	-0.6090	0.1567	0.3053	0.9144
t-statistics	*-4.31*	*-0.42*	*1.63*	*4.87*	*-3.13*	*1.98*	*2.42*	*4.18*
β_{RMRF}	1.1778	0.9842	0.9883	-0.1895	1.2670	0.9756	1.0771	-0.1899
t-statistics	*50.97*	*29.96*	*27.76*	*-5.55*	*22.39*	*45.55*	*24.92*	*-2.95*
β_{SMB}	0.1842	0.1036	0.1769	-0.0073	0.4070	-0.0445	-0.0102	-0.4172
t-statistics	*4.58*	*3.35*	*5.27*	*-0.18*	*4.79*	*-1.01*	*-0.15*	*-4.38*
β_{HML}	-0.0459	0.1342	0.0118	0.0577	0.0702	-0.0424	-0.4025	-0.4728
t-statistics	*-0.95*	*2.74*	*0.25*	*1.11*	*0.86*	*-0.93*	*-6.13*	*-4.67*
β_{CMA}	-0.1336	-0.0504	-0.1420	-0.0084	-0.6984	0.0464	-0.1270	0.5715
t-statistics	*-2.04*	*-0.87*	*-2.02*	*-0.11*	*-5.04*	*0.55*	*-1.05*	*3.85*
β_{RMW}	0.2605	0.3538	0.3357	0.0752	0.1009	0.2043	0.3018	0.2009
t-statistics	*4.63*	*7.30*	*6.04*	*1.08*	*0.69*	*4.69*	*3.60*	*1.23*
Adj.R^2	96.0%	94.1%	93.5%	37.9%	85.3%	93.4%	85.3%	32.1%

Table A6—continued

Panel B. TI/BI Portfolios

	Equal-Weighted Returns				Value-Weighted Returns			
	(1) TI/BI1 (Short)	(2) TI/BI2-4	(3) TI/BI5 (Long)	(4) TI/BI5 less TI/BI1	(5) TI/BI1 (Short)	(6) TI/BI2-4	(7) TI/BI5 (Long)	(8) TI/BI5 less TI/BI1
Fama-French 3-Factor Model								
Intercept	-0.0243	0.0728	0.1492	0.1735	-0.1661	0.1659	0.0336	0.1997
t-statistics	*-0.30*	*0.74*	*1.46*	*1.90*	*-1.14*	*2.51*	*0.27*	*1.17*
β_{RMRF}	1.0405	0.9197	0.9909	-0.0496	1.1275	0.9392	1.0688	-0.0587
t-statistics	*38.60*	*26.82*	*34.17*	*-2.46*	*26.86*	*45.88*	*28.50*	*-1.50*
β_{SMB}	0.1127	0.0120	0.0137	-0.0990	0.2011	-0.1492	-0.0581	-0.2591
t-statistics	*2.44*	*0.18*	*0.16*	*-1.76*	*2.21*	*-2.89*	*-0.59*	*-4.41*
β_{HML}	0.0796	0.1538	0.1531	0.0735	-0.0944	-0.0910	-0.1407	-0.0463
t-statistics	*2.67*	*3.34*	*3.99*	*2.09*	*-1.13*	*-2.32*	*-1.69*	*-0.74*
Adj.R^2	96.4%	91.1%	93.0%	22.9%	85.1%	93.4%	85.6%	12.9%
Carhart 4-Factor Model								
Intercept	-0.0619	0.0459	0.1398	0.2017	-0.0108	0.2267	0.1576	0.1684
t-statistics	*-0.72*	*0.44*	*1.35*	*2.29*	*-0.06*	*2.99*	*1.29*	*0.93*
β_{RMRF}	1.0647	0.9370	0.9970	-0.0677	1.0444	0.9067	1.0024	-0.0420
t-statistics	*48.30*	*33.18*	*37.93*	*-3.33*	*23.41*	*36.86*	*28.81*	*-0.93*
β_{SMB}	0.0892	-0.0048	0.0078	-0.0814	0.2341	-0.1363	-0.0317	-0.2658
t-statistics	*2.00*	*-0.08*	*0.10*	*-1.59*	*3.13*	*-3.16*	*-0.41*	*-4.13*
β_{HML}	0.0907	0.1618	0.1559	0.0652	-0.1580	-0.1158	-0.1915	-0.0335
t-statistics	*3.28*	*3.43*	*4.16*	*2.04*	*-2.21*	*-3.79*	*-2.80*	*-0.54*
β_{UMD}	0.0398	0.0285	0.0100	-0.0298	-0.2001	-0.0783	-0.1599	0.0402
t-statistics	*2.00*	*0.89*	*0.39*	*-1.46*	*-2.52*	*-2.16*	*-3.26*	*0.80*
Adj.R^2	96.5%	91.1%	93.0%	23.5%	87.9%	94.2%	87.8%	13.1%
Fama-French 5-Factor Model								
Intercept	0.0080	0.1273	0.2300	0.2220	-0.0942	0.1779	0.1170	0.2112
t-statistics	*0.10*	*1.41*	*2.50*	*2.59*	*-0.58*	*2.41*	*0.94*	*1.15*
β_{RMRF}	1.0791	0.9824	1.0393	-0.0399	1.0867	0.9905	1.0589	-0.0279
t-statistics	*42.76*	*28.23*	*38.75*	*-1.85*	*23.64*	*51.56*	*23.85*	*-0.72*
β_{SMB}	0.1726	0.1110	0.1240	-0.0486	0.2098	-0.0626	0.0070	-0.2029
t-statistics	*5.57*	*3.46*	*3.13*	*-1.29*	*3.05*	*-1.87*	*0.09*	*-3.17*
β_{HML}	0.0340	0.0816	0.1299	0.0958	0.0339	-0.1728	-0.0582	-0.0921
t-statistics	*0.88*	*1.49*	*3.23*	*2.46*	*0.49*	*-5.00*	*-0.74*	*-1.11*
β_{CMA}	-0.0419	-0.0741	-0.1732	-0.1313	-0.2725	0.0366	-0.2636	0.0090
t-statistics	*-0.85*	*-1.09*	*-3.09*	*-2.34*	*-1.61*	*0.52*	*-1.95*	*0.07*
β_{RMW}	0.2302	0.3772	0.3586	0.1284	-0.0477	0.2588	0.1164	0.1641
t-statistics	*5.82*	*7.42*	*6.58*	*2.59*	*-0.41*	*6.45*	*1.24*	*1.84*
Adj.R^2	96.9%	93.1%	95.0%	28.9%	85.4%	94.6%	86.4%	13.6%

Table A6—continued

Panel C. TEMP/BI Portfolios

	Equal-Weighted Returns				Value-Weighted Returns			
	(1) TEMP/BI1 (Short)	(2) TEMP/BI2-4	(3) TEMP/BI5 (Long)	(4) TEMP/BI5 less TEMP/BI1	(5) TEMP/BI1 (Short)	(6) TEMP/BI2-4	(7) TEMP/BI5 (Long)	(8) TEMP/BI5 less TEMP/BI1
Fama-French 3-Factor Model								
Intercept	-0.0028	0.1122	0.1247	0.1275	-0.0575	0.1530	0.1003	0.1578
t-statistics	*-0.03*	*1.20*	*1.53*	*2.14*	*-0.42*	*2.41*	*0.83*	*0.95*
β_{RMRF}	0.9622	0.9341	0.9958	0.0336	1.0482	0.9470	1.0637	0.0155
t-statistics	*28.88*	*30.26*	*35.43*	*1.60*	*32.20*	*45.85*	*29.17*	*0.34*
β_{SMB}	0.0806	0.0243	0.0349	-0.0457	0.0629	-0.1165	-0.0993	-0.1623
t-statistics	*1.20*	*0.34*	*0.53*	*-1.90*	*0.78*	*-2.08*	*-1.10*	*-2.28*
β_{HML}	0.2270	0.0939	0.0833	-0.1437	-0.0625	-0.1110	-0.0761	-0.0136
t-statistics	*6.01*	*2.34*	*2.22*	*-4.95*	*-0.95*	*-3.00*	*-0.88*	*-0.18*
Adj.R^2	92.7%	92.6%	94.4%	17.7%	84.7%	94.0%	85.0%	2.9%
Carhart 4-Factor Model								
Intercept	-0.0230	0.0895	0.1053	0.1283	0.0565	0.2101	0.2425	0.1860
t-statistics	*-0.23*	*0.89*	*1.27*	*2.06*	*0.38*	*2.73*	*1.95*	*1.01*
β_{RMRF}	0.9752	0.9487	1.0083	0.0331	0.9872	0.9165	0.9877	0.0005
t-statistics	*32.53*	*38.58*	*44.93*	*1.77*	*25.66*	*36.66*	*33.82*	*0.01*
β_{SMB}	0.0681	0.0101	0.0228	-0.0453	0.0872	-0.1044	-0.0691	-0.1563
t-statistics	*1.06*	*0.15*	*0.37*	*-2.07*	*1.29*	*-2.16*	*-0.99*	*-2.05*
β_{HML}	0.2330	0.1007	0.0891	-0.1440	-0.1092	-0.1344	-0.1343	-0.0251
t-statistics	*6.44*	*2.47*	*2.46*	*-5.21*	*-1.78*	*-4.50*	*-2.15*	*-0.33*
β_{UMD}	0.0213	0.0240	0.0205	-0.0008	-0.1469	-0.0736	-0.1831	-0.0363
t-statistics	*0.73*	*0.89*	*0.84*	*-0.03*	*-2.33*	*-1.93*	*-3.37*	*-0.58*
Adj.R^2	92.7%	92.6%	94.4%	17.4%	86.5%	94.7%	88.0%	2.9%
Fama-French 5-Factor Model								
Intercept	-0.1360	-0.0467	-0.0103	0.1257	-0.0989	0.0480	0.0554	0.1543
t-statistics	*-1.49*	*-0.53*	*-0.12*	*1.96*	*-0.65*	*0.76*	*0.44*	*0.93*
β_{RMRF}	1.0122	0.9941	1.0468	0.0346	1.0617	0.9866	1.0807	0.0190
t-statistics	*33.42*	*31.38*	*38.45*	*1.65*	*23.37*	*47.81*	*29.94*	*0.39*
β_{SMB}	0.1889	0.1167	0.1102	-0.0788	0.1494	-0.0324	-0.0643	-0.2137
t-statistics	*6.03*	*3.35*	*3.18*	*-2.68*	*2.36*	*-0.92*	*-0.80*	*-2.41*
β_{HML}	0.1976	0.0226	0.0196	-0.1780	-0.0320	-0.1600	-0.0981	-0.0661
t-statistics	*4.13*	*0.45*	*0.44*	*-5.13*	*-0.49*	*-4.81*	*-1.32*	*-0.84*
β_{CMA}	-0.1596	-0.0630	-0.0424	0.1172	-0.1903	-0.0259	-0.0077	0.1826
t-statistics	*-2.61*	*-0.97*	*-0.77*	*2.47*	*-1.25*	*-0.41*	*-0.05*	*1.25*
β_{RMW}	0.3591	0.3562	0.2962	-0.0629	0.1978	0.2349	0.0987	-0.0991
t-statistics	*8.00*	*7.21*	*6.34*	*-1.90*	*2.12*	*5.97*	*1.17*	*-1.07*
Adj.R^2	94.6%	94.3%	95.4%	21.6%	85.6%	95.1%	85.0%	4.1%

Table A6—continued

Panel D. PERM/BI Portfolios

	Equal-Weighted Returns				Value-Weighted Returns			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	PERM/BI1 (Short)	PERM/BI2-4	PERM/BI5 (Long)	PERM/BI5 less PERM/BI1	PERM/BI1 (Short)	PERM/BI2-4	PERM/BI5 (Long)	PERM/BI5 less PERM/BI1
Fama-French 3-Factor Model								
Intercept	0.0440	0.1050	0.0947	0.0507	-0.0570	0.1439	-0.0191	0.0379
t-statistics	*0.48*	*1.12*	*0.97*	*0.56*	*-0.45*	*2.25*	*-0.12*	*0.22*
β_{RMRF}	1.0547	0.9081	0.9859	-0.0687	1.0287	0.9541	1.0767	0.0481
t-statistics	*41.90*	*26.91*	*28.88*	*-2.79*	*21.06*	*56.51*	*19.17*	*0.82*
β_{SMB}	0.1395	0.0012	0.0363	-0.1032	-0.0219	-0.1248	0.0856	0.1076
t-statistics	*3.10*	*0.02*	*0.37*	*-1.53*	*-0.20*	*-2.29*	*1.29*	*1.21*
β_{HML}	-0.0270	0.1413	0.1963	0.2233	-0.0632	-0.0674	-0.1220	-0.0588
t-statistics	*-0.89*	*3.25*	*4.98*	*8.52*	*-0.60*	*-1.62*	*-1.59*	*-0.66*
Adj.R^2	95.4%	91.1%	93.1%	44.8%	81.0%	93.7%	82.2%	2.9%
Carhart 4-Factor Model								
Intercept	0.0184	0.0792	0.0876	0.0691	0.0585	0.2127	0.1104	0.0519
t-statistics	*0.19*	*0.79*	*0.89*	*0.77*	*0.43*	*3.15*	*0.75*	*0.32*
β_{RMRF}	1.0711	0.9247	0.9905	-0.0806	0.9669	0.9172	1.0075	0.0406
t-statistics	*46.36*	*35.13*	*34.91*	*-4.03*	*21.07*	*49.93*	*23.91*	*0.65*
β_{SMB}	0.1236	-0.0149	0.0319	-0.0917	0.0026	-0.1101	0.1132	0.1105
t-statistics	*2.61*	*-0.23*	*0.35*	*-1.48*	*0.03*	*-2.60*	*1.88*	*1.22*
β_{HML}	-0.0194	0.1490	0.1984	0.2178	-0.1104	-0.0956	-0.1749	-0.0645
t-statistics	*-0.65*	*3.36*	*5.45*	*9.19*	*-1.19*	*-3.10*	*-2.64*	*-0.67*
β_{UMD}	0.0270	0.0273	0.0075	-0.0195	-0.1488	-0.0887	-0.1668	-0.0180
t-statistics	*1.30*	*0.89*	*0.28*	*-0.81*	*-1.85*	*-2.76*	*-2.89*	*-0.24*
Adj.R^2	95.4%	91.1%	93.1%	44.8%	83.0%	94.6%	84.3%	2.6%
Fama-French 5-Factor Model								
Intercept	-0.0633	-0.0538	-0.0630	0.0003	-0.0112	0.1438	0.0169	0.0281
t-statistics	*-0.64*	*-0.64*	*-0.64*	*0.00*	*-0.09*	*2.00*	*0.11*	*0.18*
β_{RMRF}	1.0952	0.9679	1.0454	-0.0498	1.0533	1.0059	1.0661	0.0127
t-statistics	*43.75*	*27.92*	*31.78*	*-1.80*	*20.71*	*47.98*	*24.71*	*0.20*
β_{SMB}	0.1990	0.1026	0.1309	-0.0681	0.0579	-0.0490	0.1043	0.0465
t-statistics	*5.81*	*3.10*	*2.73*	*-1.55*	*0.70*	*-1.24*	*1.35*	*0.55*
β_{HML}	-0.0779	0.0790	0.1285	0.2063	-0.0713	-0.1594	-0.0750	-0.0037
t-statistics	*-1.85*	*1.54*	*2.59*	*5.75*	*-0.67*	*-3.90*	*-1.08*	*-0.03*
β_{CMA}	-0.0326	-0.0943	-0.0726	-0.0400	-0.1021	0.0733	-0.1227	-0.0206
t-statistics	*-0.57*	*-1.39*	*-1.13*	*-0.66*	*-0.70*	*0.92*	*-0.80*	*-0.11*
β_{RMW}	0.2349	0.3737	0.3592	0.1243	0.2021	0.2376	0.0209	-0.1811
t-statistics	*4.79*	*7.38*	*5.88*	*1.96*	*2.49*	*6.15*	*0.23*	*-1.83*
Adj.R^2	95.9%	93.2%	94.7%	46.7%	81.6%	94.6%	82.2%	3.5%

Table A6—continued

Panel E. CFO/P Portfolios

	Equal-Weighted Returns				Value-Weighted Returns			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CFO/P1 (Short)	CFO/P2-4	CFOP/5 (Long)	CFO/P5 less CFO/P1	CFO/P1 (Short)	CFO/P2-4	CFOP/5 (Long)	CFO/P5 less CFO/P1
Fama-French 3-Factor Model								
Intercept	-0.3694	0.1560	0.2566	0.6260	-0.4435	0.1464	0.3680	0.8114
t-statistics	*-3.24*	*1.61*	*2.20*	*3.78*	*-4.00*	*1.50*	*3.48*	*5.60*
β_{RMRF}	1.1006	0.8897	1.0036	-0.0970	1.0903	0.8990	0.9795	-0.1108
t-statistics	*24.29*	*24.15*	*21.82*	*-1.26*	*25.85*	*23.70*	*23.43*	*-1.56*
β_{SMB}	0.1312	-0.0055	0.0637	-0.0675	0.1038	0.0039	0.0573	-0.0464
t-statistics	*1.58*	*-0.08*	*1.11*	*-0.91*	*1.24*	*0.05*	*1.26*	*-0.59*
β_{HML}	-0.3787	0.1597	0.5926	0.9713	-0.3185	0.1582	0.5291	0.8477
t-statistics	*-7.55*	*3.42*	*12.49*	*13.93*	*-5.84*	*3.39*	*12.32*	*12.07*
Adj.R^2	94.1%	88.9%	90.6%	67.7%	84.9%	91.0%	78.0%	54.8%
Carhart 4-Factor Model								
Intercept	-0.4041	0.1243	0.2711	0.6752	-0.4724	0.1144	0.3746	0.8471
t-statistics	*-3.03*	*1.19*	*2.01*	*3.22*	*-3.75*	*1.10*	*3.16*	*4.77*
β_{RMRF}	1.1224	0.9097	0.9945	-0.1279	1.1085	0.9191	0.9753	-0.1332
t-statistics	*32.67*	*30.42*	*26.17*	*-2.18*	*33.15*	*30.53*	*29.04*	*-2.42*
β_{SMB}	0.1102	-0.0247	0.0725	-0.0377	0.0862	-0.0155	0.0614	-0.0249
t-statistics	*1.35*	*-0.36*	*1.24*	*-0.47*	*1.06*	*-0.21*	*1.43*	*-0.32*
β_{HML}	-0.3687	0.1689	0.5884	0.9571	-0.3102	0.1674	0.5272	0.8374
t-statistics	*-6.63*	*3.61*	*13.79*	*13.09*	*-5.07*	*3.57*	*12.65*	*10.53*
β_{UMD}	0.0356	0.0325	-0.0149	-0.0504	0.0297	0.0328	-0.0068	-0.0365
t-statistics	*0.81*	*1.07*	*-0.25*	*-0.54*	*0.71*	*1.06*	*-0.14*	*-0.46*
Adj.R^2	94.1%	88.9%	90.6%	67.7%	85.8%	92.0%	79.0%	54.7%
Fama-French 5-Factor Model								
Intercept	-0.4165	-0.0720	0.0867	0.5032	-0.4807	-0.0917	0.2166	0.6972
t-statistics	*-2.76*	*-0.78*	*0.63*	*2.18*	*-3.36*	*-0.95*	*1.76*	*3.39*
β_{RMRF}	1.1271	0.9836	1.0640	-0.0631	1.1117	0.9967	1.0349	-0.0768
t-statistics	*28.84*	*38.22*	*21.88*	*-0.88*	*30.28*	*37.11*	*25.18*	*-1.18*
β_{SMB}	0.1630	0.0741	0.1812	0.0182	0.1487	0.0835	0.1612	0.0125
t-statistics	*2.66*	*2.08*	*3.36*	*0.19*	*2.52*	*2.25*	*3.67*	*0.15*
β_{HML}	-0.3252	0.0701	0.5125	0.8377	-0.2521	0.0587	0.4693	0.7214
t-statistics	*-5.44*	*1.21*	*8.69*	*9.39*	*-4.29*	*1.00*	*8.04*	*8.44*
β_{CMA}	-0.1698	-0.0372	-0.0921	0.0777	-0.2111	-0.0220	-0.1028	0.1083
t-statistics	*-1.86*	*-0.49*	*-1.30*	*0.63*	*-2.53*	*-0.29*	*-1.65*	*1.13*
β_{RMW}	0.1162	0.4101	0.4161	0.2998	0.1303	0.4214	0.3696	0.2392
t-statistics	*1.65*	*8.44*	*5.11*	*2.72*	*1.98*	*8.00*	*5.73*	*2.58*
Adj.R^2	94.3%	91.1%	92.0%	68.7%	86.6%	92.9%	79.9%	56.2%

Table A6—continued

Note: The table presents the results of estimating time-series regressions of monthly portfolio excess returns on asset pricing factors. Columns (1) through (4) display the results using equal-weighted portfolio and market excess returns. Columns (5) through (8) display the results using value-weighted portfolio and market excess returns. Columns (4) and (8) display the asset pricing errors and factor loadings for hedge portfolios (highest book-tax difference group minus lowest book-tax difference group). Portfolios are sorted each month based on breakpoints determined with observable inputs at the beginning of April of each calendar year (see Figure B2). The factor models estimated are as follows:

Fama-French 3-Factor Model:

$$(R_p - R_f)_t = \alpha + \beta_{RMRF}(R_M - R_f)_t + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \varepsilon_t$$

Carhart 4-Factor Model:

$$(R_p - R_f)_t = \alpha + \beta_{RMRF}(R_M - R_f)_t + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{UMD}UMD_t + \varepsilon_t$$

Fama-French 5-Factor Model:

$$(R_p - R_f)_t = \alpha + \beta_{RMRF}(R_M - R_f)_t + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{CMA}CMA_t + \beta_{RMW}RMW_t + \varepsilon_t$$

All variables are defined in Appendix C. The estimation period includes 237 months from April 1995 to December 2014.

Table A7. Asset Pricing Errors from Time-Series Tests: Two-Way Sorted Portfolios

Panel A. BTD/A × CFO/P Portfolios, Equal-Weighted Returns

	CFO/P1 (Glamour)	CFO/P2-4	CFO/P5 (Value)	CFO/P Hedge
Fama-French 3-Factor Model				
BTD/A1 (short)	-0.466 ***	0.046	0.764	1.204 *
	[-4.54]	[0.27]	[1.26]	[1.95]
BTD/A2-4	-0.327 **	0.184 *	0.293 ***	0.619 ***
	[-2.10]	[1.83]	[2.74]	[3.16]
BTD/A5 (long)	-0.392	0.242 *	0.487 ***	0.878 **
	[-1.03]	[1.97]	[3.89]	[2.18]
BTD/A Hedge	0.074	0.196	-0.243	0.953 ***
	[0.2]	[1.11]	[-0.40]	[6.51]
Carhart 4-Factor Model				
BTD/A1 (short)	-0.485 ***	0.058	0.817	1.278 **
	[-4.48]	[0.34]	[1.39]	[2.09]
BTD/A2-4	-0.364 **	0.149	0.327 ***	0.691 ***
	[-2.02]	[1.39]	[2.79]	[2.95]
BTD/A5 (long)	-0.346	0.229 *	0.427 ***	0.773 *
	[-0.93]	[1.73]	[3.16]	[1.92]
BTD/A Hedge	0.139	0.171	-0.355	0.912 ***
	[0.40]	[0.98]	[-0.61]	[5.69]
Fama-French 5-Factor Model				
BTD/A1 (short)	-0.397 ***	0.129	0.488	0.867
	[-3.86]	[0.80]	[0.88]	[1.52]
BTD/A2-4	-0.271 *	0.222 **	0.353 ***	0.625 ***
	[-1.73]	[2.35]	[3.33]	[3.10]
BTD/A5 (long)	-0.054	0.288 **	0.566 ***	0.620
	[-0.14]	[2.34]	[4.49]	[1.55]
BTD/A Hedge	0.343	0.159	0.108	0.964 ***
	[0.94]	[0.90]	[0.20]	[6.41]

Table A7—continued

Panel B. BTD/A × CFO/P Portfolios, Value-Weighted Returns

	CFO/P1 (Glamour)	CFO/P2-4	CFO/P5 (Value)	CFO/P Hedge
Fama-French 3-Factor Model				
BTD/A1 (short)	-0.908 ***	-0.127	0.022	0.930 *
	[-3.42]	[-0.72]	[0.05]	[1.83]
BTD/A2-4	-0.342	0.204 **	0.341 **	0.683 **
	[-1.29]	[2.29]	[2.16]	[2.19]
BTD/A5 (long)	0.193	0.176	0.462 *	0.332
	[0.28]	[1.14]	[1.76]	[0.46]
BTD/A Hedge	1.055	0.303	0.440	1.370 ***
	[1.45]	[1.23]	[0.79]	[4.32]
Carhart 4-Factor Model				
BTD/A1 (short)	-0.665 **	-0.095	0.434	1.072
	[-2.49]	[-0.52]	[0.65]	[1.45]
BTD/A2-4	-0.214	0.275 ***	0.401 **	0.615 *
	[-0.89]	[3.11]	[2.33]	[1.96]
BTD/A5 (long)	0.135	0.273 *	0.514 *	0.379
	[0.27]	[1.81]	[1.92]	[0.65]
BTD/A Hedge	0.800	0.369	0.136	1.180 ***
	[1.5]	[1.52]	[0.19]	[3.38]
Fama-French 5-Factor Model				
BTD/A1 (short)	-0.604 **	-0.027	0.538	1.142 *
	[-2.10]	[-0.15]	[1.01]	[1.91]
BTD/A2-4	-0.624 **	-0.026	0.113	0.736 **
	[-2.32]	[-0.33]	[0.68]	[2.18]
BTD/A5 (long)	-0.605	0.068	0.398	1.058
	[-0.85]	[0.40]	[1.47]	[1.43]
BTD/A Hedge	-0.042	0.095	-0.140	1.001 ***
	[-0.06]	[0.37]	[-0.22]	[3.05]

Table A7—continued

Panel C. TI/BI × CFO/P Portfolios, Equal-Weighted Returns

	CFO/P1 (Glamour)	CFO/P2-4	CFO/P5 (Value)	CFO/P Hedge
Fama-French 3-Factor Model				
TI/BI1 (short)	-0.456 ***	0.120	0.382 ***	0.838 ***
	[-3.28]	[1.15]	[2.86]	[4.43]
TI/BI2-4	-0.487 ***	0.204 *	0.305 ***	0.792 ***
	[-3.44]	[1.94]	[2.76]	[4.78]
TI/BI5 (long)	-0.242	0.205 *	0.476 ***	0.717 ***
	[-1.44]	[1.77]	[3.37]	[3.20]
TI/BI Hedge	0.214	0.085	0.094	0.931 ***
	[0.95]	[0.98]	[0.59]	[4.50]
Carhart 4-Factor Model				
TI/BI1 (short)	-0.555 ***	0.086	0.400 ***	0.955 ***
	[-4.14]	[0.79]	[2.80]	[5.06]
TI/BI2-4	-0.509 ***	0.177	0.316 **	0.825 ***
	[-3.27]	[1.56]	[2.50]	[4.1]
TI/BI5 (long)	-0.183	0.170	0.456 ***	0.639 **
	[-1.06]	[1.36]	[3.12]	[2.59]
TI/BI Hedge	0.372 *	0.084	0.055	1.010 ***
	[1.87]	[0.93]	[0.34]	[4.83]
Fama-French 5-Factor Model				
TI/BI1 (short)	-0.359 **	-0.032	0.249 *	0.608 ***
	[-2.35]	[-0.30]	[1.69]	[3.07]
TI/BI2-4	-0.524 ***	-0.003	0.152	0.676 ***
	[-3.36]	[-0.03]	[1.35]	[3.29]
TI/BI5 (long)	-0.273	-0.007	0.308 **	0.581 **
	[-1.49]	[-0.07]	[2.05]	[2.37]
TI/BI Hedge	0.086	0.025	0.059	0.667 ***
	[0.38]	[0.27]	[0.33]	[3.00]

Table A7—continued

Panel D. TI/BI × CFO/P Portfolios, Value-Weighted Returns

	CFO/P1 (Glamour)	CFO/P2-4	CFO/P5 (Value)	CFO/P Hedge
Fama-French 3-Factor Model				
TI/BI1 (short)	-0.543 **	0.109	0.090	0.634 *
	[-2.02]	[0.78]	[0.38]	[1.80]
TI/BI2-4	-0.381 *	0.287 ***	0.278	0.659 ***
	[-1.80]	[3.23]	[1.59]	[2.61]
TI/BI5 (long)	-0.277	0.106	0.289	0.566
	[-0.96]	[0.65]	[1.36]	[1.59]
TI/BI Hedge	0.266	-0.003	0.199	0.832 ***
	[0.72]	[-0.02]	[0.73]	[2.60]
Carhart 4-Factor Model				
TI/BI1 (short)	-0.316	0.190	0.214	0.530
	[-1.05]	[1.47]	[0.83]	[1.43]
TI/BI2-4	-0.298	0.344 ***	0.373 **	0.671 **
	[-1.45]	[3.45]	[2.22]	[2.51]
TI/BI5 (long)	-0.084	0.192	0.383 *	0.467
	[-0.29]	[1.20]	[1.84]	[1.25]
TI/BI Hedge	0.232	0.001	0.170	0.699 **
	[0.62]	[0.01]	[0.60]	[2.00]
Fama-French 5-Factor Model				
TI/BI1 (short)	-0.298	0.064	0.082	0.380
	[-1.05]	[0.45]	[0.32]	[1.19]
TI/BI2-4	-0.223	0.242 ***	0.375 **	0.597 **
	[-1.10]	[2.74]	[2.17]	[2.36]
TI/BI5 (long)	-0.210	0.129	0.345	0.555
	[-0.76]	[0.75]	[1.62]	[1.56]
TI/BI Hedge	0.088	0.066	0.263	0.643 **
	[0.23]	[0.39]	[0.94]	[1.99]

Table A7—continued

Panel E. TEMP/BI × CFO/P Portfolios, Equal-Weighted Returns

	CFO/P1 (Glamour)	CFO/P2-4	CFO/P5 (Value)	CFO/P Hedge
Fama-French 3-Factor Model				
TEMP/BI1 (short)	-0.555 ***	0.091	0.202	0.757 ***
	[-4.07]	[0.77]	[1.46]	[4.36]
TEMP/BI2-4	-0.405 ***	0.220 **	0.367 ***	0.772 ***
	[-3.23]	[2.12]	[3.17]	[4.88]
TEMP/BI5 (long)	-0.312 **	0.172 *	0.539 ***	0.851 ***
	[-2.16]	[1.82]	[4.23]	[4.34]
TEMP/BI Hedge	0.243	0.081	0.337 **	1.094 ***
	[1.47]	[1.08]	[2.27]	[6.22]
Carhart 4-Factor Model				
TEMP/BI1 (short)	-0.572 ***	0.047	0.255	0.827 ***
	[-4.03]	[0.39]	[1.53]	[4.26]
TEMP/BI2-4	-0.463 ***	0.199 *	0.380 ***	0.843 ***
	[-3.28]	[1.79]	[3.02]	[4.58]
TEMP/BI5 (long)	-0.288 *	0.136	0.479 ***	0.767 ***
	[-1.78]	[1.33]	[3.81]	[3.53]
TEMP/BI Hedge	0.284	0.088	0.223	1.051 ***
	[1.53]	[1.20]	[1.41]	[6.16]
Fama-French 5-Factor Model				
TEMP/BI1 (short)	-0.434 ***	0.150	0.290 **	0.724 ***
	[-3.2]	[1.34]	[2.03]	[4.09]
TEMP/BI2-4	-0.355 ***	0.262 ***	0.438 ***	0.793 ***
	[-2.72]	[2.64]	[3.90]	[4.84]
TEMP/BI5 (long)	-0.231	0.200 **	0.552 ***	0.783 ***
	[-1.59]	[2.26]	[4.13]	[3.83]
TEMP/BI Hedge	0.203	0.050	0.262 *	0.986 ***
	[1.17]	[0.64]	[1.77]	[5.58]

Table A7—continued

Panel F. TEMP/BI × CFO/P Portfolios, Value-Weighted Returns

	CFO/P1 (Glamour)	CFO/P2-4	CFO/P5 (Value)	CFO/P Hedge
Fama-French 3-Factor Model				
TEMP/BI1 (short)	-0.639 **	0.208	-0.020	0.619 **
	[-2.48]	[1.48]	[-0.09]	[2.08]
TEMP/BI2-4	-0.230	0.222 **	0.238	0.467 **
	[-1.20]	[2.58]	[1.48]	[1.98]
TEMP/BI5 (long)	-0.361	0.315 ***	0.338	0.698 *
	[-1.21]	[2.61]	[1.54]	[1.96]
TEMP/BI Hedge	0.278	0.108	0.358	0.976 ***
	[0.76]	[0.79]	[1.48]	[3.20]
Carhart 4-Factor Model				
TEMP/BI1 (short)	-0.419	0.274 *	0.158	0.577 *
	[-1.6]	[1.89]	[0.73]	[1.80]
TEMP/BI2-4	-0.158	0.282 ***	0.288 *	0.446 *
	[-0.81]	[2.97]	[1.76]	[1.80]
TEMP/BI5 (long)	-0.208	0.405 ***	0.441 **	0.649 *
	[-0.70]	[3.30]	[2.20]	[1.77]
TEMP/BI Hedge	0.211	0.130	0.282	0.860 ***
	[0.57]	[0.92]	[1.15]	[2.78]
Fama-French 5-Factor Model				
TEMP/BI1 (short)	-0.416	0.180	0.074	0.491 *
	[-1.62]	[1.26]	[0.32]	[1.73]
TEMP/BI2-4	-0.087	0.193 **	0.311 *	0.398 *
	[-0.44]	[2.15]	[1.94]	[1.66]
TEMP/BI5 (long)	-0.243	0.259 **	0.340	0.583 *
	[-0.86]	[2.19]	[1.58]	[1.70]
TEMP/BI Hedge	0.173	0.079	0.266	0.757 **
	[0.46]	[0.60]	[1.01]	[2.57]

Table A7—continued

Note: The table presents the results of estimating time-series regressions of monthly portfolio excess returns on asset pricing factors using portfolios that are independently sorted on one of the respective BTD variables (e.g., *BTD/A*, *TI/BI*, or *TEMP/BI*) and on the value-glamour variable (i.e., *CFO/P*). In this table, I tabulate the asset pricing errors or alphas from each portfolio's time-series regression. Portfolios are sorted each month based on breakpoints determined with observable inputs at the beginning of April of each calendar year (see Figure B2). The factor models estimated are as follows:

Fama-French 3-Factor Model:

$$\left(R_p - R_f\right)_t = \alpha + \beta_{RMRF}\left(R_M - R_f\right)_t + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \varepsilon_t$$

Carhart 4-Factor Model:

$$\left(R_p - R_f\right)_t = \alpha + \beta_{RMRF}\left(R_M - R_f\right)_t + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{UMD}UMD_t + \varepsilon_t$$

Fama-French 5-Factor Model:

$$\left(R_p - R_f\right)_t = \alpha + \beta_{RMRF}\left(R_M - R_f\right)_t + \beta_{SMB}SMB_t + \beta_{HML}HML_t + \beta_{CMA}CMA_t + \beta_{RMW}RMW_t + \varepsilon_t$$

All variables are defined in Appendix C. The estimation period includes 237 months from April 1995 to December 2014. *** (**) [*] indicates a two-tailed *p*-value of less than 0.01 (0.05) [0.10].

APPENDIX B. FIGURES

Figure B1. Construction of Long and Short Portfolios for BTD/A

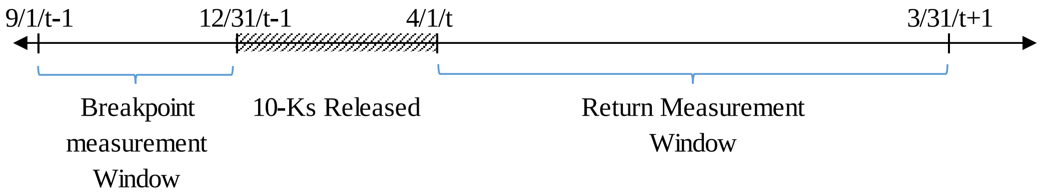
	BTD		
PTACC	**LNBTD (TI > BI)**	**SmallBTD**	**LPBTD(BI > TI)**
1 (lowest)	(1,1)	(1,2)	
2	(2,1)		
3			
4			
5			
6			
7			
8			
9	(9,1)		
10 (highest)	(10,1)	(10,2)	

	BTD		
PTCF	**LNBTD (TI > BI)**	**SmallBTD**	**LPBTD(BI > TI)**
1 (lowest)		(1,2)	(1,3)
2			(2,3)
3			
4			
5			
6			
7			
8			
9			(9,3)
10 (highest)		(10,2)	(10,3)

= Buy = Sell

Note: This figure depicts the independent sorts that are required to construct the *BTD/A* trading strategy, based on the evidence from Hanlon (2005). First, annual decile ranks are created based on pretax accruals (*PTACC*) and pretax cash flows (*PTCF*). Firm-years are also sorted annual based on whether they have large negative book-tax differences (*LNBTD*) (lowest quintile of *BTD/A*), small book-tax differences (*SmallBTD*) (middle three quintiles of *BTD/A*), and large positive book-tax differences (*LPBTD*) (highest quintile of *BTD/A*). From there, each firm-year is assigned to one of three groups: short portfolio, long portfolio, and an intermediate portfolio. For example, for firm-years with extreme positive accruals and *LNBTD*, a short position is taken, whereas for firm-years with extreme positive cash flows and *LPBTD*, a long position is taken. If the assignment from pretax accrual and *BTD/A* sort disagrees with the assignment from the pretax cash flow and *BTD/A* sort, the firm year is assigned to the intermediate portfolio as the assignment is inconclusive.

Figure B2. Timing of Decile Breakpoint Measurement



Note: This figure describes how I estimate the quantile (e.g., decile or quintile) breakpoints for relevant sorting variables and ranked variables. Breakpoints are based on 10-Ks that are filed by firms with fiscal year ends ending between September 1 and December 31. I assume these 10-Ks are completely filed by April 1. As of April 1, firm-years are then grouped based on their observed values relative to the new breakpoints. When a firm issues new financial statements, they are assigned to the group based on the newly realized values relative to in-place breakpoint values. Each April 1, new breakpoints are computed and firms are reassigned based on those new breakpoints.

APPENDIX C. VARIABLE DEFINITIONS

This appendix details how I measure each variable in my empirical analyses. I obtain all data items from Compustat Fundamentals Annual File and CRSP Monthly Stock File unless otherwise noted. Compustat item names are included in parentheses. All returns are expressed as percentages (i.e., multiplied by 100) for exposition.

Returns Measures:	
$R_i - R_f$	Monthly security-specific raw returns in excess of the risk-free rate. For monthly return predictability tests, I use excess returns beginning with the fourth month of firm i's fiscal year *t* and extending through the third month of firm i's fiscal year t + 1.
$R_p - R_f$	Monthly portfolio value-weighted (equal-weighted) returns less the risk-free rate. Measured contemporaneous to factor returns in time-series asset pricing tests.
R_f	Risk-free rate, measured as the one-month Treasury bill rate from Ibbotson Associates.
Book-Tax Differences Measures:	
$TI/BI_{i,t}$	Lev and Nissim (2004) *total* book-tax differences for firm i in year *t*: TI/BI, where TI is taxable income, measured as current tax expense (TXFED+TXFO, or TXT-TXDI if missing) divided by the top federal statutory tax rate less the change in NOLs (TLCF), then multiplied by one minus that tax rate to enhance comparability with after-tax book income, BI represents net income before extraordinary items (IB).
$TEMP/BI_{i,t}$	Lev and Nissim (2004) *temporary* book-tax differences for firm *i* in year *t*: $TEMP/BI$, where $TEMP$ is measured as deferred tax expense (TXDFED + TXDFO, or TXDI if missing) divided by the top federal statutory tax rate, then multiplied by one minus that tax rate to enhance comparability with after-tax book income.
$PERM/BI_{i,t}$	Lev and Nissim (2004) *permanent* book-tax differences for firm *i* in year *t*: $PERM/BI$, where $PERM$ is measured as $[BI - TI] - TEMP$.
$BTD/A_{i,t}$	Hanlon (2005) *temporary* book-tax differences for firm i in year *t*: deferred tax expense (TXDFED + TXDFO, or TXDI if missing) divided by the top federal statutory tax rate (τ), scaled by average total assets (AT).
$LNBTD_{i,t}$	1 if an observation falls in the lowest quintile of BTD/A based on annual sorts, 0 and otherwise.
$LPBTD_{i,t}$	1 if an observation falls in the highest quintile of BTD/A based on annual sorts, and 0 otherwise.
$SmallBTD_{i,t}$	1 if an observation falls in the middle three quintiles of BTD/A based on annual sorts, and 0 otherwise.

Cross-Sectional Tests—Controls:	
$CFO/P_{i,t}$	Natural logarithm of operating cash flows (OANCF) minus *Size* for firm i at the end of fiscal year t.
$Beta_{i,t}$	Firm-year specific market Beta, estimated as the CAPM slope coefficient from rolling 60-month estimation windows set to end in the last month of fiscal year t for firm i. Estimates are generated by regressing monthly firm-specific excess returns on monthly market excess returns. All excess returns adjusted by R_f.
$Size_{i,t}$	Natural logarithm of market value of equity (CSHO × PRCC_F) for firm i at the end of fiscal year t.
$BTM_{i,t}$	Natural logarithm of book value of equity (CEQ) minus $Size$ for firm i at the end of fiscal year t.
$EP_{i,t}$	Natural logarithm of operating income after depreciation (OIADP) less $Size$ for firm i at the end of fiscal year t.
$CP_{i,t}$	Natural logarithm of operating income before depreciation (OIBDP) less $Size$ for firm i at the end of fiscal year t.
$Sales\_Growth_{i,t}$	Three-year rolling average of annual sales growth, where each year's sales growth is estimated as the change in sales (SALE) scaled by the sales from the previous year.
$BHRET6_{i,t}$	Long-term momentum, buy-hold raw returns for firm i compounded over months -1 through -7 relative to the month being tested.
$BHRET36_{i,t}$	Long-term reversal, buy-hold raw returns for firm i compounded over months -1 through -36 relative to the month being tested.
$PTBI_{i,t}$	Pretax book income (PI) scaled by average total assets (AT) for firm i at the end of fiscal year t.
$PTCF_{i,t}$	Pretax cash flows from operations, measured as total operating cash flows (OANCF) plus income taxes paid (TXPD), scaled by average total assets, for firm i at the end of fiscal year t.
$PTACC_{i,t}$	Pretax accruals, measured as $PTBI$ less $PTCF$, scaled by average total assets, for firm i at the end of fiscal year t.
$LN\_ISSUE_{i,t}$	Natural logarithm of shares outstanding in month -1 less the natural logarithm of the split-adjusted shares outstanding in month -12 relative to the month being tested.
$Guenther_{i,t}$	Set of variables for firm i in year t identified by Guenther (2011) as determinants of large book-tax differences: (1) $Age_{i,t}$, which is firm age measured as years present in Compustat; (2) $highSPI1_{i,t}$ = 1 if special items/average total assets > 0.07; (3) $lowSPI1_{i,t}$ = 1 if special items/average total assets < -0.07; (4) $highSPI2_{i,t}$ = 1 if non-operating income/average total assets > 0.1;

	(5) $lowSPI2_{i,t}$ = 1 if non-operating income/average total assets < -0.1;
	(6) $highSPI3_{i,t}$ = 1 if gain or loss reported on the income statement/average total asset > 0;
	(7) $lowSPI3_{i,t}$ = 1 if gain or loss reported on the income statement/ average total asset < 0;
	(8) $highSPI4_{i,t}$ = 1 if gain or loss reported on the statement of cash flows/average total assets > 0.07; and
	(9) $lowSPI4_{i,t}$ = 1 if gain or loss reported on the statement of cash flows/average total assets < -0.07.
Factor Returns—Time-Series Tests: [35]	
$RMRF$	Monthly CRSP value-weighted (equal-weighted) market return in excess of the risk-free rate in tests that use value-weighted (equal-weighted) portfolio returns as the dependent variable.
SMB	Monthly size factor-mimicking (small minus big) portfolio returns.
HML	Monthly book-to-market factor-mimicking (high minus low) portfolio returns.
UMD	Monthly momentum factor-mimicking (up minus down) portfolio returns.
CMA	Monthly investment factor-mimicking (conservative minus aggressive) portfolio returns.
RMW	Monthly accrual factor-mimicking (robust minus weak) portfolio returns.

[35] All monthly factor returns obtained from Kenneth French's data library (http://mba.tuck.dartmouth.edu/pages/faculty/ ken.french/data_library.html).

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