CAN MISPRICING OF ASSET GROWTH EXPLAIN THE ACCRUALS ANOMALY?

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ABSTRACT

Recent research suggests that the mispricing of asset growth can explain the accruals anomaly. We reexamine this issue by focusing on the role of accounting manipulations in stock mispricing. Specifically, we hypothesize that accounting manipulations are at the root of the accruals anomaly but play an insignificant role in the asset growth anomaly. Our large sample results strongly support our hypothesis, suggesting that investors can benefit from exploiting both anomalies instead of one.

JEL: G10, M4

KEYWORDS: Accruals anomaly, growth anomaly, value-glamour, growth in long-term net operating assets

INTRODUCTION

Since Sloan's (1996) seminal study, academic research has documented a strong inverse relationship between accounting accruals and future stock returns, which is often referred to as the accruals anomaly. Another line of research finds that asset growth, such as growth in net operating assets, exhibits return predictability similar to accruals. Because total accruals can be viewed as growth in *short-term* net operating assets, it is natural to ask how the accruals anomaly and the asset growth anomaly are related. Fairfield et al. (2003) find that the market seems to equivalently misprice total accruals and growth in *long-term* net operating assets, and posit that the accruals anomaly may be a specific manifestation of a more general growth anomaly. Their conclusion has important implications for investors. Portfolio theory suggests that investing in two closely related strategies reduces the benefit of diversification and over-exposes investors to unidentified fundamental economic risks. In this study, we reexamine the relationship between the accruals anomaly and the asset growth anomaly.

Our study is motivated by both theoretical and methodological considerations. From a theoretical perspective, existing evidence suggests that the accruals anomaly and the asset growth anomaly may arise for different reasons. In particular, prior studies suggest that accounting manipulations play an important role in explaining the accruals anomaly. However, the asset growth anomaly literature does not view accounting manipulations as an important reason for the anomaly. For example, Fairfield et al. (2003) argue that investors misprice growth in net operating assets because they fail to understand the negative effect of investments on earnings due to conservative accounting and diminishing marginal return on investments. Similarly, Titman et al. (2004) hypothesize that excess capital expenditure is negatively associated with future stock returns because investors underreact to empire building. Thus, the significantly different role of accounting manipulations in these two types of anomalies suggests that they are different from each other.

From a methodological point of view, Fairfield et al. (2003) draw their conclusion from the Mishkin test (Mishkin, 1983). The Mishkin test is a rational expectations framework that requires specifications of both an earnings expectations model and a pricing model. Because the Mishkin test is highly sensitive to the choice of variables included in the models (e.g., Kraft et al., 2007) and there is no consensus on the correct specification for the earnings expectation model, we reexamine the relationship between the accruals anomaly and the asset growth anomaly using more robust tests.

Our study differs from prior studies in several important ways. First, we emphasize the different roles played by accounting manipulations in accruals and asset growth anomalies. Specifically, Fairfield et al. (2003) focus on total accruals, but prior research suggests that the abnormal accruals, which result from accounting manipulations, are more informative of future stock returns (e.g., Xie, 2001; Chan et al., 2006). In this study, we provide original evidence on the relationship between abnormal accruals and the asset growth anomalies. In our view, these are stronger tests of the assertion that the accruals anomaly is an asset growth anomaly in disguise. Second, we also compare the excess capital expenditure anomaly (Titman et al., 2004) with the accruals anomaly. The excess capital expenditure anomaly is closely related to the growth in long-term net operating assets anomaly in Fairfield et al. (2003). If Fairfield et al.'s theory is correct, we should find that the accruals anomaly and the excess capital expenditure anomaly are indistinguishable as well. According to our knowledge, there is no research on this issue. Lastly, we use both portfolio and regression tests, which are robust techniques commonly used in the empirical asset pricing literature. Not only they avoid the problems of the Mishkin test, they also simulate real trading and hence are more relevant to investors.

Using a large cross-sectional sample of U.S. firms from 1973 to 2005, we find strong evidence suggesting that the accruals anomaly is distinct from the asset growth anomaly. Specifically, we find that the performance of the total accruals and abnormal accruals strategies are largely independent of the level of growth in long-term net operating assets or excess capital expenditure. Moreover, we find that, compared to the total accruals strategy, the abnormal accruals strategy earns higher risk-adjusted returns and is more independent from the asset growth strategies. Our results are robust to industry effects and various estimations of abnormal accruals. The important message of our research is that investors can earn higher risk-adjusted returns from exploiting both accruals and asset growth anomalies.

In the next section, we review recent literature. In the following section, we discuss sample and methodology. Next, we discuss our empirical results and robustness tests. In the last section, we conclude.

LITERATURE REVIEW

The accruals anomaly was first documented by Sloan (1996). He finds that stocks with high accounting accruals tend to underperform stocks with low accounting accruals, and this phenomenon cannot be explained by common risk factors such as beta, size and book-to-market ratio. Pincus et al. (2007) find that the accruals anomaly is not unique to the U.S. market. They document the existence of the accruals anomaly in Australia, Canada, and the UK.

Sloan (1996) explains the accruals anomaly from the perspective of different persistence of accruals and operating cash flows with respect to future earnings. Specifically, he shows that accruals are less persistent than operating cash flows. If investors fail to recognize the lower persistence of accruals, they will tend to overestimate (underestimate) future earnings of firms with high (low) accruals and hence overvalue (undervalue) such firms. The accruals anomaly thus reflects the price correction with respect to this particular bias of investors.

Although this reasoning is very compelling, some researchers remain doubtful of the existence of the accruals anomaly. A natural question to ask is whether the accruals anomaly is simply another familiar anomaly in disguise. Collins and Hribar (2000) compare the accruals anomaoly with the well-known post-earnings-announcement-drift anomaly and find that the two anomalies are distinct from each other. Another concern is that the accruals anomaly may just be a different manifestation of the traditional value/glamour anomaly such as the book-to-price and earnings-to-price ratios. Desai et al. (2004) show that the traditional value-glamour strategies do not explain the accruals anomaly either, although they find that operating-cash-flows-to-price ratio seems to capture the accruals anomaly.

Recently, some studies find that asset growth, measured in various ways, is negatively associated with future stock returns. For example, Titman et al. (2004) document that excessive capital expenditure is inversely associated with future stock returns. Penman and Zhang (2002) and Hirshleifer et al. (2004) show that growth in net operating assets is a negative predictor of future returns. Fairfield et al. (2003) decompose growth in net operating assets into growth in *current* and *long-term* net operating assets, where growth in *current* net operating assets is equivalent to Sloan's (1996) total accruals. They find that both growth in *current* (i.e., accruals) and *long-term* net operating assets have similar negative correlations with future stock returns. They posit that the negative return predictability of both growth in current and long-term net operating assets comes from investors' failure to understand the implication of investment (i.e., growth in operating assets) on one-year-ahead earnings. Investment has negative impact on near-term earnings and can be attributable to both conservative accounting and the law of diminishing marginal returns. Conservative accounting makes firms record immediate expenditures associated with the investment, but not its benefits. And the law of diminishing marginal returns suggests that, in equilibrium, firms' future investments should always be less profitable than their earlier investments. In sum, Fairfield et al. (2003) argue that their evidence supports the view that the accruals anomaly is just a special case of a more general growth phenomenon.

The growth explanation of the accruals anomaly has its merits, but it conflicts with the earnings persistence argument put forth by Sloan (1996). More importantly, past research shows that the lower persistence of accruals is primarily due to earnings manipulation. For example, Xie (2001) decomposes accruals into discretionary and non-discretionary components and finds that the accruals anomaly only exists for discretionary accruals. This finding is important because discretionary accruals are usually viewed as the result of accounting manipulations. Chan et al. (2006) and Richardson et al. (2006), using different methodologies and samples, draw similar conclusions. Moreover, Bradshaw et al. (2001) show that sophisticated financial statement users do not seem to understand the negative implication of accruals for future earnings, supporting the view that the accruals anomaly reflects mispricing due to investors' failure to see through earnings manipulations.

DATA AND METHODOLOGY

We conduct our analysis using all domestic stocks traded on NYSE, AMEX and NASDAQ from 1973 to 2005, with available data from Compustat and CRSP. To ensure that our results are not driven by a liquidity premium, we remove observations with prices below \$1, market values less than \$10 million, or book value of equity less than \$10 million when portfolios are formed. We also remove ADRs, closed-end funds, and REITs. For each sample firm, we require sufficient data to compute accruals. Lastly, to exclude firm-year observations that induce noise in the measurement of accruals, where: (1) Compustat estimates working capital components, or (2) managers make voluntary accounting changes that affect operating income or working capital accounts, or (3) goodwill increases from year to year. The final sample is comprised of 55,239 firm-year observations.

Following the literature, we use annual data to compute total accruals (TACC) and define it as growth in operating working capital accounts (GrWC) less current-period depreciation and amortization expense (DEPAMORT), deflated by average total assets (the firm subscript, i, is suppressed hereafter): $TACC_t = (GrWC_t – DEPAMORT_t)/([TA_t+TA_{t-1}]/2)$, and $GrWC_t = (\Delta AR_t+\Delta INV_t+\Delta OTHERCA_t) – (\Delta AP_t+ \Delta OTHERCL_t)$, where ΔAR is change in accounts receivable, ΔINV is change in inventories, ΔOTHERCA is change in other current assets, ΔAP is change in accounts payable, ΔOTHERCL is change in other current liabilities, DEPAMORT is depreciation and amortization expense, and TA is total assets.

Abnormal accruals (AACC) are estimated using an augmented modified Jones model that further controls for profitability and growth (e.g., Kothari et al., 2005). The model is as follows: $TACC_t = \beta_1\ 1/AVGTA_t + \beta_2\ (\Delta SAL_t-\Delta AR_t)/AVGTA_t + \beta_3\ PPE_t/AVGTA_t + \beta_4\ ROA_t + \beta_5\ SALGRO_t + \varepsilon_t$, where $AVGTA_t = [TA_t+TA_{t-1}]/2$, SAL is sales, PPE is net plant, property and equipment, ROA = earnings available to common shareholders / $AVGTA_t$, and SALGRO is the average sales growth for the past three years. We estimate the model every year and the regression residual, ε_t, is the firm-year specific estimate of abnormal accruals (AACC).

We select two measures of growth: growth in long-term net operating assets and excess capital expenditures. We select these two measures because they both have been shown to predict future stock returns. Following Fairfield et al. (2003), we define growth in long-term net operating assets (GrLTNOA) as the difference between growth in net operating assets (GrNOA) and accruals (TACC): $GrLTNOA_t = GrNOA_t - TACC_t$, where GrNOA is the annual change in net operating assets, deflated by average total assets: $GrNOA_t = (NOA_t-NOA_{t-1})/([TA_t+TA_{t-1}]/2)$, and $NOA_t = AR_t + INV_t + OTHERCA_t + PPE_t + INTANG_t + OTHERLTA_t - AP_t - OTHERCL_t - OTHERTL_t$, where INTANG is intangibles, OTHERLTA is other long-term assets, and OTHERTL is other long-term liabilities. Following Titman et al. (2004), we define excess capital expenditure (EXCAPX) as the ratio of current year's capital expenditure divided by the average of last three years' capital expenditure minus one: $EXCAPX = CAPX_t/(CAPX_{t-1}+CAPX_{t-2}+CAPX_{t-3}) - 1$, where CAPX is capital expenditure.

We form trading portfolios at the beginning of July every year from 1973 to 2005. To ensure financial data are available to investors when trading portfolios are formed, we require at least four months between the fiscal year-end and July. We sort firms into equal size quintile portfolios, based on TACC, AACC, GrLTNOA and EXCAPX. For all strategies, the trading rule is to buy firms in the bottom quintile and simultaneously short-sell firms in the top quintile. Hedge returns of the trading strategy are the total returns of the long and short positions. We hold the trading positions for twelve months and then liquidate the positions to form new portfolios.

We measure abnormal returns as characteristics-adjusted returns, where characteristics are book-to-market equity, size and price momentum (Daniel et al., 1997; Titman et al., 2004). The procedure is as follows. First, at the beginning of July of year t, we sort all firms into five portfolios based on firm size at the end of June of year t. The breakpoints for size portfolios are based on the quintile breakpoints of NYSE firms. Next, in each size portfolio, we sort all firms into equal-size quintiles based on book-to-market ratio at the end of June of year t. Finally, in each size/book-to-market portfolio, we sort all firms into equal-size quintiles based on their prior-year stock performance, skipping the most recent month. Overall, 125 size/book-to-market/momentum benchmark portfolios are formed. The abnormal return of a firm is the difference between the return of the firm and the value-weighted return of the benchmark portfolio it belongs to: $AR_{i,t} = R_{i,t} - R_{b,t}$, where $AR_{i,t}$ is the characteristics-adjusted abnormal return of firm i for period t, $R_{i,t}$ is the return of firm i for period t, and $R_{b,t}$ is the return of characteristics benchmark b that firm i belongs to for period t.

EMPIRICAL RESULTS

Table 1: Descriptive Statistics

Variable	Mean	Standard Deviation	First Quartile	Median	Third Quartile
ROA	0.093	0.136	0.053	0.102	0.159
TACC	-0.027	0.086	-0.071	-0.031	0.012
AACC	-0.005	0.076	-0.044	-0.003	0.037
GrLTNOA	0.096	0.117	0.034	0.071	0.129
EXCAPX	0.463	0.364	0.261	0.383	0.549

This table presents descriptive statistics for the 55,239 firm-year observations in our sample (NYSE, AMEX, NASDAQ) from 1973 to 2005.

Table 1 provides descriptive statistics for our key variables. To mitigate the influence of outliers, we winsorize each variable at the top and bottom 1%. The mean (median) ROA for the sample is 0.093 (0.102), while the mean (median) total accruals (TACC) are -0.027 (-0.031). TACC is on average negative because depreciation and amortization usually outweigh working capital accruals. Abnormal accruals (AACC) are about 20% the magnitude of TACC: mean (median) AACC is -0.005 (-0.003). Growth in long-term net operating assets (GrLTNOA) is much larger than TACC, with a mean (median) of 0.096 (0.071). The mean and median excess capital expenditure (EXCAPX) show that on average firms increase their capital expenditure by about 46% relative to their three-year average; this is comparable to figures reported in prior studies (e.g., Fairfield et al., 2003; Titman et al., 2004).

Table 2: Pearson and Spearman Correlations

	ROA	TACC	AACC	GrLTNOA	EXCAPX
ROA	-	0.256	-0.021	0.224	0.271
TACC	0.251	-	0.811	-0.027	0.198
AACC	0.024	0.888	-	0.060	0.122
GrLTNOA	0.126	-0.029	0.041	-	0.526
EXCAPX	0.090	0.174	0.127	0.436	-

Pearson (Spearman) correlation coefficients are reported below (above) the diagonal.

Table 2 presents correlations among our main variables. TACC is highly correlated with ROA, GrLTNOA and EXCAPX. Firms with higher profitability tend to grow faster and the strong growth can lead to higher total accruals. TACC is slightly negatively correlated with GrLTNOA, but has a positive correlation with EXCAPX. Overall, the evidence does not support the view that TACC and asset growth are fundamentally related. Lastly, the correlation between AACC and ROA is much smaller than that between TACC and ROA, reflecting the fact that ROA has been controlled when we estimate abnormal accruals. AACC is also positively correlated with both asset growth measures; high growth firms are in greater need to manage earnings so they will not spoil the market's high expectations of them.

Next, to confirm the relationships between our accruals and asset growth variables and future stock returns, we sort each of the four variables into equal-size quintile portfolios. Quintile 1 (Quintile 5) represents the 20 percent of stocks with the lowest (highest) value of the sorting variable. The trading rule is to buy stocks in Q1 and short stocks in Q5. Returns for Q1, Q5 and Q1-Q5 are all equal-weighted.

Table 3: Univariate Results

	Strategies			
	TACC	AACC	GrLTNOA	EXCAPX
Q1 (Buy)	0.42%	2.11%	-0.41%	-1.19%
Q2	1.07%	0.49%	0.11%	0.68%
Q3	-0.28%	-0.55%	0.18%	0.53%
Q4	-0.37%	-0.94%	-0.42%	0.33%
Q5 (Short)	-3.41%	-3.95%	-2.28%	-3.20%
Q1-Q5 (Hedge)	3.83%	6.06%	1.87%	2.01%

*The numbers reported are characteristics-adjusted returns (t-statistics are reported in the parentheses). Q1 is the bottom quintile and Q5 is the top quintile. *, **, and *** denote significance levels of 0.1, 0.05 and 0.01 from a two-tailed test, respectively.*

Table 3 reports univariate results. For each trading strategy we report the characteristics-adjusted returns for its five quintile portfolios, as well as the hedge portfolio, Q1-Q5. For the TACC and AACC strategies, we confirm the results of Sloan (1996) and Xie (2001) using our more-recent data; this provides out-of-sample evidence on the robustness of prior findings. The average annual abnormal returns earned by the TACC hedge strategy is 3.83%, significant at the 0.01 level but weaker than that reported in Sloan (1996). This difference is probably due to several reasons. First, we sort firms into quintiles instead of deciles. The annual return of the TACC strategy increases to 5.25% when deciles are used. Second, we measure the abnormal returns adjusted for size, book-to-market and price momentum factors, while Sloan only considers the size factor. Third, the TACC strategy has been adopted by many investment funds in recent years and our sample includes data from recent years. The AACC strategy earns much higher abnormal returns than the TACC strategy (6.06% vs. 3.83%), supporting the view that the return predictability of total accruals is primarily driven by its proxy for accounting manipulations (e.g., Xie, 2001). Moreover, returns from Q1 to Q5 decrease monotonically for the AACC strategy, but this pattern is weaker for the TACC strategy.

The two asset growth strategies, however, do not yield significant abnormal returns in our quintile specification (1.87% for GrLTNOA strategy and 2.01% for EXCAPX strategy). Untabulated results reveal that a decile-portfolio specification results in both strategies earning significant abnormal returns (3.97% for GrLTNOA [t-stat=2.11] and 3.62% for EXCAPX [t-stat=2.08]). Overall, our results are consistent with Fairfield et al. (2003) and Titman et al. (2004), but we find that the returns to the asset growth strategies have weakened in recent years. Finally, for all strategies the returns are dominated by the short quintile portfolio (i.e., Q5), suggesting that the information content of these variables is asymmetrically distributed.

The main goal of our study is to determine whether the performance of accruals-based strategies depends on asset growth variables. Specifically, can the TACC and AACC strategies earn significant abnormal returns if we control for the level of asset growth? If the accruals-based anomalies are truly a manifestation of a more general asset growth anomaly, we expect to find that the TACC and AACC strategies cease to perform once the level of asset growth is controlled for. On the other hand, if accruals-based strategies do not largely overlap with asset-growth strategies, we expect to find that the TACC and AACC strategies continue to perform regardless of the level of asset growth.

Following the literature, we use two approaches to examine the performance of accruals-based strategies conditional on the level of asset growth. The first approach is a portfolio test, while the second approach is a regression test. We independently sort stocks into quintiles based on the accruals and asset growth measures. Since our focus is on stocks in the top or bottom quintiles, we merge the middle three quintiles (Q2, Q3 and Q4) into one portfolio. Thus, for every strategy, we have three portfolios: low (Q1), medium (Q2-Q4) and high (Q5). The interaction between any two strategies generates nine portfolios (3 x 3).

Table 4: Portfolios Tests

Panel A: Total Accruals and Growth in Long-Term Net Operating Assets Strategies

		TACC			
		Low (Q1)	Medium (Q2-Q4)	High (Q5)	Low - High
GrLTNOA	Low (Q1)	1.49%	0.16%	-4.52%	6.01% (2.50)**
	Medium (Q2-Q4)	1.11%	0.40%	-2.56%	3.67% (1.90)*
	High (Q5)	-1.92%	-2.05%	-3.84%	1.92% (1.25)
	Low - High	3.42% (1.32)	2.21% (1.21)	-0.70% (-0.38)	

Panel B: Abnormal Accruals and Growth in Long-Term Net Operating Assets Strategies

		AACC			
		Low (Q1)	Medium (Q2-Q4)	High (Q5)	Low - High
GrLTNOA	Low (Q1)	2.76%	-1.03%	-3.88%	6.64% (2.60)**
	Medium (Q2-Q4)	1.79%	0.38%	-3.76%	5.55% (4.01)***
	High (Q5)	1.47%	-2.52%	-4.53%	6.00% (3.91)***
	Low - High	1.29% (0.54)	1.50% (1.40)	0.65% (0.26)	

*The numbers reported are characteristics-adjusted returns (t-statistics are reported in the parentheses). Q1 is the bottom quintile and Q5 is the top quintile. *, **, and *** denote significance levels of 0.1, 0.05 and 0.01 from a two-tailed test, respectively.*

We first examine the interaction between the TACC and GrLTNOA strategies. Results are reported in Table 4, Panel A. The last column reports the hedge returns of the TACC strategy, conditional on different levels of GrLTNOA. The last row reports the hedge returns of the GrLTNOA strategy, conditional on different levels of TACC. We find that the TACC strategy generates significant abnormal returns for all GrLTNOA levels except when GrLTNOA is high. For example, when GrLTNOA is low (medium), the abnormal returns of the TACC strategy is 6.01% (3.67%). The insignificant abnormal return of the TACC strategy when GrLTNOA is high is primarily driven by the low return of the Low TACC / High GrLTNOA portfolio (-1.92%). As before, both TACC and GrLTNOA strategies are dominated by the negative abnormal returns earned by firms with high TACC or GrLTNOA. When TACC and GrLTNOA rankings disagree, the ranking with negative information dominates.

In Panel B of Table 4, we report the interactions of the AACC strategy and the GrLTNOA strategy. We find that the AACC strategy generates large, significant abnormal returns regardless of the level of GrLTNOA. For example, the AACC strategy generates 6.64%, 5.55% and 6.00% annual abnormal returns when GrLTNOA is low, medium and high, respectively. These returns are much larger than the corresponding returns for the TACC strategy conditional on GrLTNOA (6.01%, 3.67% and 1.92%, respectively). The results in Table 4 strongly suggest that, contrary to the conclusion of prior studies, both TACC and AACC strategies are distinct from the GrLTNOA strategy. Moreover, the difference between the accruals-based strategy and the asset growth strategy is accentuated when we focus on abnormal instead of total accruals, potentially because total accruals are a noisier proxy than abnormal accruals for the economic variable underlying the accruals anomaly.

Our general conclusion does not change when we use excess capital expenditure (EXCAPX) to proxy for asset growth. Table 5, Panel A reports the conditional analysis results for the TACC strategy and the EXCAPX strategy. Similar to results in Table 4, we find that the TACC strategy is effective when the level of EXCAPX is either low or medium. When the EXCAPX level is high, the TACC strategy does not earn significant abnormal return because the Low TACC / High EXCAPX is dominated by the negative information in high EXCAPX (-3.17%).

Table 5: Portfolio Tests: Excess Capital Expenditure Strategies

Panel A: Total Accruals and Excess Capital Expenditure Strategies

		TACC			
		Low (Q1)	Medium (Q2-Q4)	High (Q5)	Low - High
EXCAPX	Low (Q1)	-1.05%	-0.08%	-6.21%	5.16% (2.38)**
	Medium (Q2-Q4)	2.36%	0.59%	-2.09%	4.45% (3.89)***
	High (Q5)	-3.17%	-2.39%	-4.72%	1.55% (0.76)
	Low - High	2.12% (0.97)	2.31% (1.57)	-1.50% (-0.74)	

Panel B: Abnormal Accruals and Excess Capital Expenditure Strategies

		AACC			
		Low (Q1)	Medium (Q2-Q4)	High (Q5)	Low - High
EXCAPX	Low (Q1)	1.63%	-1.33%	-4.43%	6.05% (2.24)**
	Medium (Q2-Q4)	2.94%	0.76%	-2.84%	5.78% (5.40)***
	High (Q5)	0.56%	-2.84%	-5.83%	6.40% (3.85)***
	Low - High	1.06% (0.60)	1.50% (1.13)	1.41% (0.42)	

*The numbers reported are size-adjusted returns (t-statistics are reported in the parentheses). Q1 is the bottom quintile and Q5 is the top quintile. *, **, and *** denote significance levels of 0.1, 0.05 and 0.01 from a two-tailed test, respectively.*

Table 5, Panel B reports that the AACC strategy not only earns significant abnormal returns regardless of the levels of EXCAPX, it also earns larger returns than the TACC strategy at the same EXCAPX level. Specifically, the AACC strategy earns 6.05%, 5.78% and 6.40% per annum when the EXCAPX level is low, medium and high, respectively. The corresponding numbers for the TACC strategy are 5.16%, 4.45% and 1.55%. Collectively, results in Table 5 corroborate those in Table 4, strongly supporting the view that the accruals anomaly is different from the asset growth anomaly.

Our portfolio tests measure the abnormal return of a stock as the difference between its return and the value-weighted return of its corresponding size/book-to-market/momentum benchmark portfolio. The advantage of this approach is that it does not assume any specific return distribution; however, it ignores the differences of firms in the same benchmark portfolio. An alternative method to measure abnormal returns is to use a formal asset pricing model to compute expected returns. Of course, the effectiveness of this approach is only as good as the model inputs and the reasonableness of assumptions (e.g., linearity). The dominant empirical asset pricing model in the literature is the four-factor model (Fama and French, 1993; Carhart, 1997). It has the following form: $R_{i,t} - R_{f,t} = \alpha_{i,t} + \beta_1 * MMF_t + \beta_2 * SMB_t + \beta_3 * HML_t + \beta_4 * UMD_t + \varepsilon_{i,t}$, where $R_{i,t}$ is the return of firm i for period t, $R_{f,t}$ is the risk-free return for period t, MMF, SMB, HML and UMD are the beta, size, book-to-market and momentum factor returns. The intercept of the regression, $\alpha_{i,t,}$ is the abnormal return estimated from the four-factor model. We form nine interaction portfolios (3 x 3) in the same manner we did for the above portfolio tests. We estimate the model using calendar month data for each of the nine interaction portfolios.

In Table 6, Panel A we report the regression results for the interactions between the TACC and GrLTNOA strategies. As we observed in the portfolio tests (Table 4), the TACC strategy earns significant abnormal returns at all levels of GrLTNOA except when GrLTNOA is high. Also, it appears that the insignificant return of the TACC strategy when GrLTNOA is high is due to the low return earned by stocks in the Low TACC / High GrLTNOA portfolio. Results in Panel B of Table 6 are also comparable to those in Panel B of Table 4, but slightly weaker. The AACC strategy earns significant returns when GrLTNOA is low or medium, but not when GrLTNOA is high.

Table 6: Regression Tests: Growth in Long-Term Net Operating Assets Strategies

Panel A: Total accruals and growth in long-term net operating assets strategies

		TACC			
		Low (Q1)	Medium (Q2-Q4)	High (Q5)	Low - High
GrLTNOA	Low (Q1)	0.208	0.154	-0.237	0.445 (3.26)***
	Medium (Q2-Q4)	0.318	0.218	-0.224	0.542 (5.23)***
	High (Q5)	-0.290	-0.165	-0.312	0.215 (0.13)
	Low - High	0.498 (2.80)***	0.319 (2.88)***	0.075 (0.50)	

Panel B: Abnormal accruals and growth in long-term net operating assets strategies

		AACC			
		Low (Q1)	Medium (Q2-Q4)	High (Q5)	Low - High
GrLTNOA	Low (Q1)	0.405	0.106	-0.368	0.773 (5.55)***
	Medium (Q2-Q4)	0.441	0.158	-0.162	0.603 (6.57)***
	High (Q5)	-0.066	-0.293	-0.169	0.104 (0.76)
	Low - High	0.471 (2.83)***	0.399 (3.66)***	-0.198 (-1.21)	

*All variables are sorted into equal-size quintiles each year within each industry (two-digit SIC code).The numbers reported are the intercepts from a four-factor regression model. t-statistics are reported in parentheses. Q1 is the bottom quintile and Q5 is the top quintile. *, **, and *** denote significance levels of 0.1, 0.05 and 0.01 from a two-tailed test, respectively.*

Table 7 reports the results for the interactions between the TACC and AACC strategies with the EXCAPX strategy. Again, the results are highly consistent with those reported in the portfolio tests (Table 5). Specifically, the TACC strategy is effective except when EXCAPX is high, while the performance of the AACC strategy is completely independent of the level of EXCAPX. Overall, the regression tests provide evidence that is consistent with that from the portfolio tests. Results of both tests strongly suggest that the accruals-based anomalies are distinct from the asset-growth-based anomalies.

Table 7: Regression Tests: Excess Capital Expenditure Strategies

Panel A: Total accruals and excess capital expenditure strategies

		TACC			
		Low (Q1)	Medium (Q2-Q4)	High (Q5)	Low - High
EXCAPX	Low (Q1)	0.118	0.098	-0.395	0.513
					(3.59)***
	Medium (Q2-Q4)	0.258	0.215	-0.251	0.508
					(5.40)***
	High (Q5)	-0.163	-0.055	-0.167	0.004
					(0.02)
	Low - High	0.281	0.153	-0.227	
		(1.50)	(1.50)	(-1.56)	

Panel B: Abnormal accruals and excess capital expenditure strategies

		AACC			
		Low (Q1)	Medium (Q2-Q4)	High (Q5)	Low - High
EXCAPX	Low (Q1)	0.395	-0.020	-0.278	0.673
					(4.92)***
	Medium (Q2-Q4)	0.399	0.133	-0.132	0.531
					(6.02)***
	High (Q5)	0.128	-0.078	-0.300	0.428
					(2.85)***
	Low - High	0.267	0.057	0.021	
		(1.49)*	(0.55)	(0.15)	

*All variables are sorted into equal-size quintiles each year within each industry (two-digit SIC code). The numbers reported are the intercepts from a four-factor regression model. t-statistics are reported in parentheses. Q1 is the bottom quintile and Q5 is the top quintile. *, **, and *** denote significance levels of 0.1, 0.05 and 0.01 from a two-tailed test, respectively.*

ROBUSTNESS TESTS

There is no consensus on the correct specification of the model that estimates abnormal accruals. We consider two alternative models. First, we estimate the model used in Xie (2001), which excludes the last two terms of our model (i.e., ROA and SALGRO). Second, we estimate the performance-adjusted model used in Kothari et al. (2005), which includes the ROA term, but excludes the SALGRO term. Third, we estimate we also consider operating cash flows in lieu of balance sheet data to calculate total accruals (e.g., Hribar and Collins, 2002). Our results are qualitatively unchanged when we consider each of these alternative tests. Lastly, to control for industry effects, we re-estimate abnormal accruals and re-sort all key variables within industry (two-digit SIC code) each year. Untabulated results show that this industry adjustment increases the returns earned by the TACC, GrLTNOA and EXCAPX strategies, but decreases the returns of the AACC strategy. Overall, the industry adjustment improves the strategies' performance since the average returns of the GrLTNOA and EXCAPX strategies are now significant. We replicate our main tests using the industry-adjusted variables and find little change in the tenor of our earlier results.

CONCLUSION

Prior research finds that asset growth and accruals exhibit similar return predictability (Sloan, 1996; Penman and Zhang, 2002; Fairfield et al., 2003; Hirshleifer et al., 2004; Titman et al., 2004). Using the Mishkin test, Fairfield et al. (2003) suggest that the accruals anomaly is an asset growth anomaly in disguise. Although their result is intriguing, it is subject to two concerns. First, there is evidence suggesting that the accruals anomaly and the asset growth anomaly arise for fundamentally different reasons. In particular, accounting manipulations play a central role in the accruals anomaly, but are rather unimportant for the asset growth anomaly. Second, the Mishkin test is sensitive to the specification of the earnings expectation model, but there is no consensus on the correct specification of the model.

In this study, we compare two accruals-based anomalies, TACC and AACC, with two asset growth anomalies, GrLTNOA and EXCAPX. We include AACC because it is a better proxy for accounting manipluations than TACC. We include EXCAPX so we can test Fairfield et al.'s conclusion using a different asset growth anomaly. To avoid the methodological problems of the Mishkin test, we use portfolio and regression tests.

Our evidence does not support the view that the accruals anomaly is a manifestation of the asset growth anomaly. In contrast, we find that both TACC and AACC perform well after controlling for GrLTNOA or EXCAPX. Moreover, consistent with the view that accounting manipulations are at the core of the accruals anomaly, we find that AACC outperforms TACC, and is more independent of the asset growth anomalies than TACC. Overall, our results suggest that investors should view accruals-based strategies and asset growth-based strategies as two different types of strategies. Moreover, the correlation between the two types of strategies can be further reduced (so diversification benefit can be augmented) if investors focus on abnormal accruals instead of total accruals.

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