# Cash Flow is King: Cognitive Errors by Investors

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## ABSTRACT

When investors fixate on current earnings, they commit a cognitive error and fail to fully value the information contained in accruals and cash flows. Extending the accrual anomaly documented by Sloan [1996], we identify significant excess returns from a cash flow-based trading strategy. The market consistently underestimates the transitory nature of accruals and the long-term persistence of cash flows. We find that the accrual anomaly derives from the poor performance of high accrual firms, which are more likely to manage earnings. Combining the accrual and cash flow information also reveals that investors misvalue the quality of earnings. Contrary to Fama [1998], these anomalies are robust to the three-factor model with equally or value-weighted portfolio returns.

**Keywords:** *Accruals, Cash flows, Earnings quality, Market efficiency, Behavioral Finance*.

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# Cash Flow is King: Cognitive Errors by Investors

## 1. Introduction

In a controversial study, Sloan [1996] proposes that capital markets fixate on current earnings and fail to fully price the information contained in the accrual and cash components.[1] More specifically, he finds that investors systematically overreact to accrual earnings, despite their lower persistence than cash earnings. Sloan captures the mispricing with a low-risk trading strategy that simultaneously holds a long position in low accrual firms and a short position in high accrual firms. Although the hedge is based on publicly available data, it yields an average annual excess return of more than 10 percent and generates positive returns across 28 of the 30 years in the sample.

This evidence suggests that investors systematically commit a cognitive error when valuing the information contained in earnings. Financial theory proposes that the value of an asset is the discounted present value of its future cash flows. Dreman [1998] conveys this assessment:

> If we take two companies with similar outlooks, markets, products, and management talent, the one with the higher cash flow will usually be the more rewarding stock. In investing, as in your personal finances, cash is king (p. 50).

However, Block [1999] provides evidence that earnings fixation is pervasive throughout the financial community. In fact, his survey reveals that financial analysts actually rank earnings as a more important valuation tool than cash flows.

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[1] Accruals represent the change in non-cash current assets less depreciation expense and the change in current liabilities (exclusive of short-term debt and taxes payable), all divided by average total assets. Complete variable definitions are provided in the Appendix.

Sloan's anomalous result strikes at the heart of the efficient market hypothesis. The semi-strong form of market efficiency implies that current prices reflect all publicly available information. Fundamental analysis, such as a simple accrual-based hedge strategy, should not reward investors with significantly positive excess returns. Among the numerous studies that document potential violations of market efficiency, the post-earnings announcement drift originally documented by Ball and Brown [1968] suggests that investors do not even immediately realize the impact of current earnings.[2]

Since the market appears to overvalue accrual earnings, testing for cash flow mispricing represents a logical extension. After identifying positive excess returns to a cash flow-based trading strategy, we explore the relationship between the accrual and cash flow anomalies. We provide evidence that, although negatively related, the hedge portfolios consist of relatively unique firms with distinct size, book-to-market, and persistence characteristics. Combined, accruals and cash flows reveal information about the underlying quality of earnings. While investors tend to fixate on earnings, we find that the market fails to account for their underlying quality.

Our study is also in the spirit of Lakonishok, Shleifer, and Vishny [LSV 1994] who find that firms with high earnings-to-price (E/P) and cash flow-to-price (C/P) ratios generate higher returns as a result of the suboptimal behavior of the average investor. However, our methodology differs in several respects. First, we utilize companies listed

[2] Foster, Olsen, and Shevlin [1984], Ou and Penman [1989], Bernard and Thomas [1989, 1990], and Abarbanell and Bushee [1998] have identified anomalous relationships in fundamental accounting information. Research in the finance literature has uncovered potential violations of market efficiency as well. These papers include, among others, Ritter [1991], Lakonishok, Shleifer, and Vishny [1994], Dreman and Berry [1995], Loughran and Ritter [1995], Spiess and Affleck-Graves [1995], Michaely, Thaler, and Womack [1995], Ikenberry, Lakonishok, and Vermaelen [1995], and Spiess and Affleck-Graves [1999].

on the New York Stock Exchange (NYSE), American Stock Exchange (Amex), and Nasdaq. LSV examine NYSE and AMEX-listed firms. Second, our accounting definitions focus on operating earnings, which we separate into accruals and operating cash flows. LSV measure cash flow as earnings before extraordinary items plus depreciation. Finally, our portfolios are formed purely on publicly available accounting information. LSV form portfolios on earnings and cash flow scaled by price.

Accruals and cash flows each provide an incremental contribution to security returns.[3] Thus, the value relevance of earnings equals the sum of the information communicated by the accrual and cash components. The market weights each variable differently because they reveal distinct information about future earnings. Since they are more persistent and less subject to manipulation, cash earnings express higher quality than accrual earnings. Therefore, if investors interpret each component independently, then the accrual and cash flow anomalies capture unique market mispricing.

Using a dataset spanning 1963 to 1993, we provide several contributions to the literature.[4] First, we extend Sloan's [1996] investigation of the accrual anomaly and examine the cash component of earnings. We report that the accrual and cash flow-based hedge portfolios generate average excess returns of 8.2 and 10.4 percent per year, respectively. Proponents of market efficiency, such as Fama [1998], contend that value-weighted portfolio regressions against the three-factor model eliminate most anomalies. Fama asserts that many anomalous results simply derive from previously documented

[3] For example, see Rayburn [1986], Bowen, Burgstahler, and Daley [1987], Ali [1994], Dechow [1994], and Cheng, Liu, and Schaefer [1996].

[4] The dataset used by Sloan [1996] contains only NYSE and Amex-traded firms from the 1962-1991 period.

small-firm and book-to-market (BE/ME) effects. Although size and BE/ME patterns emerge across both hedge portfolios, the equally and value-weighted portfolio excess returns are robust to the Fama and French [1993] three-factor model.

We also explore the characteristics and similarities between the accrual and cash flow-based trading strategies. Sloan [1996] proposes that the negative association between accruals and cash flows assures a strong correlation and similar excess returns between the two anomalies. Although the two hedges provide similar excess returns, they share considerably less than half of the same firms. The extreme deciles also exhibit unique size, book-to-market, and persistence characteristics. This evidence implies that the market misprices the unique information contained within accruals and cash flows.

We also find that the market reaction to the accrual and cash flow components of earnings varies across deciles. Investors consistently underreact to the persistence of cash component of earnings across deciles. High cash flow firms significantly outperform the three-factor benchmark, while low cash flow firms significantly lag the benchmark. However, the market mispricing is less systematic across accrual deciles. In fact, we report that excess returns of the accrual-based hedge derive almost entirely from the firms in the high accrual decile. This evidence suggests that the market is routinely fooled by the potential for these firms to manage earnings.

Finally, combining earnings with either accruals or cash flows provides information about a firm's overall quality of earnings. Because cash flow is king, a firm with high earnings quality implies that it has a large proportion of cash earnings. We find that, despite investor's fixation with current earnings, the market fails to adequately consider the overall quality of those earnings. In fact, an earnings quality hedge portfolio generates

equally weighted excess returns of almost 16.0 percent per year. These returns suggest that accrual and cash flow anomalies do in fact capture separate mispricing.

We propose that investor valuation of current earnings exhibits a cognitive error. The market appears to fixate on earnings and fails to fully realize the information conveyed by accruals and cash flows. Because they anchor on earnings, investors consistently underestimate the transitory nature of accruals and the long-term persistence of cash flows. This lack of fundamental analysis also neglects to acknowledge the differences in earnings quality across firms.

The rest of the paper is organized as follows. Section 2 outlines the sample selection process, variable definitions, and excess return methodology. Section 3.A analyzes summary statistics of the accrual and cash flow portfolios. Section 3.B describes the long-term buy-and-hold returns. Section 3.C calculates excess returns using the Fama and French [1993] three-factor model. Section 3.D examines excess returns of hedge portfolios on earnings quality. Finally, Section 4 concludes the study.

## 2. Data and Methodology

Sample selection procedures follow Sloan [1996] with a few exceptions. First, while the accounting literature generally focuses on NYSE and Amex firms, this study includes firms traded on the Nasdaq exchange.[5] Including Nasdaq-traded firms provides a

[5] Nasdaq-traded firms enter the sample in cohort year 1973 when they become available on CRSP. Nasdaq firms are also relatively scarce on the Compustat tapes for the early years of the sample, but the inclusion of these firms has become more prevalent in recent years. Nasdaq-listed firms are generally smaller, young, growth companies, which are often associated with higher levels of accruals and lower cash flows. However, the market is not expected to interpret the accrual or cash flow components of earnings for Nasdaq firms any differently than those trading on the NYSE or Amex.

larger sample size and increases the number of firms used to form the accrual and cash flow hedge portfolios. Concentrating only on NYSE and Amex-traded firms disregards many leading over-the-counter companies such as Microsoft, Intel, and Cisco Systems. The Nasdaq has grown substantially over the past two decades. With 4,829 companies and a total market capitalization of $5.2 trillion, the Nasdaq now boasts more listed firms than the NYSE, which contains 3,025 listed firms valued at $16.0 trillion.[6]

Our dataset is also free of selection bias. For inclusion in the Sloan [1996] sample, firms must report income in the subsequent year.[7] This requirement introduces a look-ahead bias that cannot be replicated by investors. For example, consider two delisted firms, one removed following bankruptcy and one acquired in a leverage buy-out (LBO). The Sloan sample will exclude the bankrupt firm for the delisting year since Compustat will not contain the necessary financial statement information. However, if the LBO firm has debt outstanding, Compustat might report the needed information, so the Sloan sample might include the LBO firm. Although this selection bias does not materially affect Sloan's original results, our sample does not require firms to report subsequent earnings. Firms may exit or delist due to bankruptcy, takeover, or merger.

Our sample encompasses all firms with available Compustat information listed on the Center for Research on Security Prices (CRSP) NYSE, Amex, and Nasdaq daily tapes

[6] Based on 1999 year-end data as reported by the NYSE (www.nyse.com) and Nasdaq (www.nasdaq.com). The Amex listed only 679 companies with a market value of $0.1 trillion at the end of 1999.

[7] See Sloan [1996], footnote 5, page 293. This requirement eliminates approximately 3.5 percent of Sloan's sample.

during 1963-1993.[8] In addition, we include only firms with 12-month, fiscal years ending on December 31.[9] We also remove all banks, insurance companies, American Depository Receipts (ADRs) and Real Estate Investment Trusts (REITs). The final sample contains 50,928 firm years from the NYSE, Amex, and Nasdaq exchanges. Nasdaq-listed firms represent approximately 39 percent of the sample.

The primary financial variables measured for each fiscal year include earnings, accruals, and cash flows (all scaled by average total assets). Market and book values of equity are also recorded as of December 31 for each fiscal year. Complete variable definitions are provided in the Appendix. The effects of outliers are minimized by winsorizing the top and bottom one percent of variable observations (except for market value) at the 1 and 99 percent levels.

Buy-and-hold returns (including all distributions) are calculated for each firm year beginning four months after the fiscal year-end. According to Alford, Jones, and Zmijewski [1994], over 96 percent of NYSE, Amex, and Nasdaq firms file their annual reports (Form 10-K) with the Securities and Exchange Commission (SEC) within 120 days of their corresponding fiscal year-end. Since the sample contains only firms with December 31 fiscal years, we assume each firm publicly releases its financial statements by

[8] According to Davis [1994], the Compustat database contains a survivorship bias, especially for pre-1963 sample periods. The bias developed because Compustat routinely back-filled the financial history of the more successful firms in its database. Sloan [1996] begins his sample in 1962 for this same reason. However, our sample selection starts in 1963 to correspond with the availability of the Fama and French [1993] factor realizations used to measure excess returns.

[9] Using only firms with fiscal years ending on December 31 creates a more manageable trading strategy. Accrual and cash flow hedge portfolios, with simultaneous long and short positions from the extreme deciles, are assembled and held for one year. Sloan [1996] allows firms to have non-December 31 fiscal year-ends. The potential difficulty arises when relatively few firms share the same fiscal year-end. For example, if only 30 firms have May 31 fiscal year-ends, each decile will contain only three firms, which must be used to form a hedge portfolio. Focusing only on December 31 year-ends allows the hedge portfolio to be formed just once each year.

April 30 of year *t+1*, so one-year return calculations begin on this date. If a security delists during the year, proceeds from the issue (last available price) are invested in the NYSE, Amex, and Nasdaq value-weighted index until the end of the holding period.

As a robustness check, we calculate both equally and value-weighted portfolio returns. Value-weighted returns minimize any bias (i.e., the bid-ask bounce) resulting from smaller, less-liquid firms. Because more analysts and investors follow large firms, we would not expect to earn significant value-weighted excess returns by trading on publicly available information. Investors may also find it difficult to take large positions or sell short the securities of smaller, less liquid companies.

Portfolio excess returns are measured by the intercept from Fama and French [1993] three-factor regressions. The three-factor model has become a standard in the finance literature. The three factors include variables documented to significantly influence historical returns: market risk (beta), size, and the book-to-market ratio.[10] Fama and French [1993] contend that these factors explain most of the cross-sectional variation in portfolio returns. We will present evidence that the accrual and cash flow hedge portfolios display size and book-to-market effects. Therefore, the three-factor model controls for the cross-sectional differences from these variables in the hedge portfolio excess returns. When measuring excess returns, Sloan [1996] separately adjusts for size factors at the individual firm level and market risk at the portfolio level. The three-factor model simultaneously accounts for all three variables.

[10] The development of beta has roots in the early work of Sharpe [1964] and Lintner [1965]. Among others, Banz [1981] and Reinganum [1981] identified the size anomaly. Finally, De Bondt and Thaler [1987], Jaffe, Keim, and Westerfield [1989], and Fama and French [1992] study cross-sectional returns across book-to-market ratios.

The three-factor regressions estimate the following relationship for each decile portfolio from July 1963 to April 1993 (370 months):[11]

$$r_{pt} - r_{ft} = a + b(r_{mt} - r_{ft}) + sSMB_t + hHML_t + e_{pt} \qquad (1)$$

The dependent variable is the monthly holding-period portfolio return (including all distributions) minus the corresponding yield on the three-month U.S. Treasury bill. Each of the three independent variables correspond to the cross-sectional effect of market risk ($r_{mt} - r_{ft}$), firm size ($SMB_t$), and the book-to-market ratio ($HML_t$) on monthly portfolio returns. For specific factor definitions, see Fama and French [1993].

## 3. Empirical Analysis

### A. Summary Statistics

On April 30 of each year *t+1* (1963 to 1993), accrual portfolios and cash flow portfolios are created separately by ranking and sorting all NYSE and Amex firms into ten equal groups. Consistent with Fama and French [1992, 1993], Nasdaq firms are then added to the appropriate portfolios based on the NYSE/Amex cutoffs. Panel A of Table 1 displays summary statistics of the accrual deciles for NYSE and Amex-traded firms only and offers a direct comparison to Sloan [1996]. Panel B describes the complete sample of NYSE, Amex, and Nasdaq firms. Including Nasdaq-listed firms and requiring December 31 fiscal year-ends does not materially alter the summary statistics.

[11] The first hedge portfolio is formed on April 30, 1963, while the Fama and French [1993] monthly factor realizations begin in July 1963. Fama and French form portfolios six months after fiscal year-end to allow for the public dissemination of each company's financial statements. Our portfolios are formed on April 30 to be consistent with Sloan [1996]. Therefore, the three-factor regression analysis is conducted using 370 months of data.

Table 1 reveals a positive relationship between accruals and earnings, as firms with high accruals tend to report high earnings. However, accruals and cash flows are negatively related. Firms with low accruals generally have high cash flows, and vice versa. This result is not entirely surprising given that earnings are defined to equal the sum of the accrual and cash flow components (see Appendix). The average annual correlation between accruals and earnings, cash flows and earnings, and accruals and cash flows (all deflated by average total assets) is 0.22, 0.75, and -0.46 respectively. Thus, cash flow is strongly correlated with earnings. Although his hedge portfolio is based solely on accrual earnings, Sloan [1996, p. 292] acknowledges that, "The trading strategy could also be stated in terms of the relative magnitude of the cash flow component of earnings." We identify the excess returns from the cash flow-based trading strategy and examine whether they derive from the same firms as the accrual anomaly.

Table 1 demonstrates that the high and low accrual deciles, which form the hedge portfolios, generally have lower market values. However, this small-firm bias is only identified in firms with the lowest cash flow. The high cash flow deciles generally contain the largest firms. Including Nasdaq-listed companies does not significantly alter the size trend across accrual or cash flow portfolios.

The average book-to-market ratio is also measured across the deciles in Table 1. Panel B reveals a growth firm bias (low BE/ME ratio) among the high accrual decile. Meanwhile, Panel D suggests a monotonic relationship between BE/ME and cash flow. Low cash flow firms are more likely to be value firms (high BE/ME ratio), while high cash flow firms are generally growth firms. These trends are not significantly altered by the inclusion of the growth-oriented Nasdaq.

To further explore the relationship among the hedge portfolios, Table 2 shows the overlapping firm-year observations when firms are cross-ranked into accrual and cash flow deciles. In Panel A, approximately 46 percent of firms simultaneously appear in the low cash flow and high accrual deciles, while only 38 percent of firms in the high cash flow decile are categorized in the low accrual decile. Panel C reveals that Nasdaq firms tend to cluster in the extreme portfolios, as almost 27 and 19 percent of Nasdaq firms fall in the low cash flow and high accrual deciles, respectively. Nasdaq firms are generally smaller, younger, and more growth oriented than NYSE or Amex firms.

Sloan [1996] documents that the persistence of current earnings depends on the relative magnitudes of the accrual and cash flow components, with cash flows being more persistent than accruals. Table 3 provides an alternate measure of persistence and lists the proportion of firms across each decile between year *t* and year *t+1*. Thus, the table reveals the likelihood that a surviving firm will be ranked in the same decile across two consecutive years. In Panel A, 29.6 percent of firms from the highest accrual decile of year *t* also ranked in the highest accrual decile during year *t+1*. Firms in the extreme accrual deciles also exhibit a greater tendency to reverse their ranking the following year. By comparison, the greater persistence of cash flows is described in Panel B. Almost half, 47.0 percent, of high cash flow firms in year *t* maintain their ranking in the high cash flow decile the following year. The persistence across decile rankings implies that the momentum effects of a few firms may influence the accrual or cash flow anomalies.

The evidence suggests that the accrual and cash flow anomalies derive from different firms with distinct characteristics. While the high and low accrual portfolios generally contain smaller firms, only the low cash flow portfolio displays a small-firm bias.

In addition, the BE/ME ratio displays no significant trend across accrual deciles but is monotonically related to cash flow. Cash flow rankings are also more persistent than accrual rankings. Finally, a majority of the firms comprising the accrual and cash flow hedges are unique. This evidence leads us to conclude that the accrual and cash flow anomalies, although negatively related, stem from unique pricing errors by investors.

B. Annual Buy-and-Hold Returns of Accrual and Cash Flow Portfolios

Table 4 reports the mean and median buy-and-hold returns of the accrual and cash flow deciles for three years after portfolio formation. Holding-period returns are inversely related to accruals and positively associated with cash flows. For example, the lowest accrual portfolio realized an average return of 18.4 percent in year *t* compared to the 10.2 percent of the highest accrual portfolio. The low and high cash flow portfolios recorded similar average year *t* returns of 10.4 percent and 18.6 percent, respectively. The same overall pattern emerges across median portfolio returns.

Table 4 also provides the returns from simple hedge portfolios formed by simultaneously combining a long position in the low accruals (high cash flow) portfolio with an equal short position in the high accruals (low cash flow) portfolio. The excess returns from these trading strategies are positive and robust for up to three years after the portfolio formation. Both hedge portfolios yield an average excess return of 8.2 percent in year *t+1* and 4.2 percent in year *t+2*. Sloan [1996] identifies the same overall pattern using size-adjusted returns and the Jensen's alpha technique. Consistent with previously noted studies, the evidence implies that mispricing is a long-term phenomenon. Two years after portfolio formation, investors still do not fully realize the information contained in the accrual and cash flow components of earnings.

C. Excess Returns of Accrual and Cash Flow Portfolios

The summary statistics suggest that the accrual and cash flow hedges exhibit distinct size and book-to-market characteristics. In addition, Sloan [1996] reports that firms comprising the accrual-based hedge portfolios have higher average betas than the rest of the sample. Therefore, measuring excess returns from three-factor regression intercepts will remove the market, size and BE/ME effects from the accrual and cash flow portfolio returns. Fama and French [1992] report that, historically, small firms have outperformed large firms and value stocks have outperformed growth stocks. Thus, the SMB (small minus big) and HML (high BE/ME minus low BE/ME) factors of the Fama and French [1993] model capture the cross-sectional returns associated with size and book-to-market over time.[12]

Fama [1998] contends that many anomalies reported in the literature disappear when portfolio returns are value-weighted against three-factor regressions. He asserts that often these results manifest from a small-firm bias. However, we demonstrate the accrual and cash flow anomalies are robust to value-weighted portfolio formation.

Table 5 reports three-factor regression results for accruals-based portfolios. In Panel A, the equally weighted, high accrual portfolio significantly underperforms the benchmark by -0.53 percent per month, while the low accrual portfolio outperforms the benchmark, but by a statistically insignificant 0.15 percent per month. The hedge portfolio, which takes a long position in the low accrual decile and an equal short position

[12] Sloan includes the ln(BE/ME) as an independent variable (along with accruals, size, beta, and earnings-to-price) in the cross-sectional analysis of Table 7. In these regressions, accruals, size and BE/ME exhibit significant explanatory power for up to three years after measurement. These results suggest that adjusting for size and BE/ME may account for a portion of the excess returns from the accrual anomaly.

in the high accrual decile, returns 0.68 percent per month or approximately 8.2 percent annually, similar to the raw return reported in Table 4. Value-weighted portfolios do not eliminate the size or significance of the hedge portfolio return.

The three-factor regressions in Table 6 confirm the presence of a cash flow anomaly. In Panel A, the low cash flow decile lags the benchmark by a statistically significant -0.52 percent per month, while the high cash flow portfolio outperforms the benchmark by a significant 0.36 percent per month. The cash flow-based hedge portfolio simultaneously holds a short position in low cash flow firms and an equal long position in high cash flow firms. This trading strategy yields an annualized excess return of more than 10.4 percent. Once again, value-weighted portfolios in Panel B do not materially alter the performance of the decile or hedge portfolios.

Figure 1 charts the excess returns of three-factor regressions across equally weighted accrual and cash flow deciles. The excess returns of accrual portfolios in Panel A do not display a very compelling relationship after adjusting for beta, size and BE/ME effects. In fact, the accrual anomaly mainly results from the weak performance of high accrual firms. Low accrual firms do not significantly outperform the three-factor benchmark. In contrast, the excess returns of Panel B are monotonic across cash flow portfolios. Thus, the cash flow anomaly derives almost equally from the poor returns of low cash flow firms and the strong performance of high cash flow firms.

The coefficients on the Fama and French [1993] factors for market risk, size, and BE/ME are highly significant across the accrual and cash flow regressions, so the factors do influence portfolio returns. However, these variables cannot eliminate the excess returns of the accrual and cash flow anomalies. Like Sloan [1996], we conclude that

investors fixate on current earnings and fail to fully value the information contained in the accrual and cash components, a cognitive error that leads to long-term mispricing. Stock prices act as though investors consistently underestimate the persistence of cash flows. By comparison, investors appear to efficiently value the accrual portion of earnings, except for firms with the highest level of accruals.

Accruals can be separated into discretionary and non-discretionary components. Subramanyam [1996] concludes that, even though discretionary accruals are often used to manipulate earnings, each component conveys information to investors about future earnings. Xie [1999] also discovers that most of the accrual anomaly reported by Sloan [1996] arises from the mispricing of discretionary accruals. Therefore, firms comprising the high accrual portfolio are more likely to have actively managed their current earnings. Investors consistently overvalue this portfolio. In fact, they actually appear to reward firms for engaging in earnings management.

D. Market Mispricing of Earnings Quality

Because it fixates on current earnings, the market consistently undervalues cash flows and overvalues accruals. Each component contains unique information about future earnings. Together, they reveal the quality of a firm's current earnings. The imperfect correlation between the accrual and cash flow anomalies suggests that merging the hedge portfolios will generate even greater excess returns. A portfolio with high earnings quality (low accruals and high cash flows) should significantly outperform the market, while a low earnings quality portfolio (high accruals and low cash flows) will significantly lag the market. Unfortunately, the intersection of these extreme deciles contains an insufficient

number of firms to provide meaningful results.[13] For instance, the low accruals-high cash flow portfolio contains only 5 firms during the 1964 cohort year. Because this strategy focuses on just two of the 100 cross-ranked portfolios, we employ an alternative mechanism to screen firms with high and low earnings quality.

Figure 2 outlines the construction of the earnings quality hedge. Since earnings equal the sum of the accrual and cash flow components, a firm with high earnings and low accruals must have high cash flows. Overall, this high cash flow-low accruals firm also has a high quality of earnings. The additional earnings-based sort allows us to construct high and low earnings quality portfolios from the accrual and cash flow hedges while maintaining an adequate number of firms to provide meaningful results.

Earnings portfolios are formed on April 30 of each year by dividing all NYSE and Amex firms into two equal groups (low and high) on the basis of earnings scaled by average total assets. Nasdaq firms are then added according to the median NYSE/Amex-determined cutoffs. Merging the earnings portfolios with the existing accrual or cash flow deciles produces 20 new cross-sectional portfolios, but our focus remains on those firms with the highest and lowest accruals or cash flows. Excess returns for both equally and value-weighted portfolios are measured by three-factor regression intercepts.

Table 7 demonstrates the incremental excess return generated by an earnings quality hedge formed from cash flows and earnings. Panel A shows that the low earnings quality portfolio (row 2) significantly underperforms the market by -0.99 percent per month, while the high earnings quality portfolio (row 3) outperforms the market by 0.34

[13] Unreported tests confirm that combining the accrual and cash flow hedge portfolios improves the excess return over the accrual-only and cash flow-only hedge.

percent per month. The earnings quality hedge simultaneously combines a short position in low cash flow-high earnings firms with an equal long position in high cash flow-low earnings firms. This strategy generates an excess return of almost 16.0 percent per year, compared to the 10.4 percent excess return from the cash flow-only hedge.[14] Panel B also demonstrates that value-weighting the portfolios does not significantly diminish the size of the hedge portfolio excess returns. Thus, the earnings-based sort supplies additional information about accruals and earnings quality that significantly improves the hedge performance. These results also support Collins and Hribar [2000] who find that the accrual and earnings anomalies capture different aspects of market mispricing.[15]

The excess returns from the cash flow and earnings-based trading strategy are also robust across time. Figure 3 displays the raw, buy-and-hold (including all distributions) returns associated with the cash flow and earnings hedge portfolios. The low-risk portfolio generates positive returns in 23 out of 31 years during the sample period.

## 4. Summary and Conclusion

Seeking to explain an ever-growing body of literature questioning the basic tenets of market efficiency, researchers have turned to models of market psychology and

[14] The earnings quality hedge can also be derived from accruals and earnings as defined in Panel A of Figure 2. This hedge simultaneously combines a short position in the high accrual-low earnings portfolio with an equal long position in the low accrual-high earnings portfolio. Although not reported, this strategy generates a significant excess return of 12.0 percent per year and is positive in 25 out of 31 years of the sample period.

[15] Collins and Hribar [2000] examine the difference between the accrual anomaly of Sloan [1996] and the post-earnings announcement drift as measured by Bernard and Thomas [1990]. They report evidence of significant abnormal returns associated with quarterly accrual, cash flow, and unexpected earnings-based trading strategies. They conclude that the unexpected earnings and accrual-based anomalies appear to capture different mispricing phenomena, and a combination of the two strategies significantly increases the magnitude of abnormal returns.

behavioral finance. For example, Barberis, Shleifer, and Vishny [1998] and Daniel, Hirshleifer, and Subrahmanyam [1998] develop models where investors overreact to information confirming prior beliefs and underreact to disconfirming information. The mispricing arises because investors are overconfident about the precision of their private information. However, proponents of market efficiency, such as Fama [1998], argue that most anomalies disappear after properly adjusting for previously reported effects such as market risk, size, and book-to-market ratios or by value-weighting portfolio returns.

This study extends the analysis of the accrual anomaly documented by Sloan [1996] in several ways. First, we identify that a trading strategy, based on the cash component of earnings, also yields significant excess returns. Investors consistently underestimate the long-term persistence of cash flows. Second, contrary to Fama [1998], we demonstrate that the accrual and cash flow anomalies are robust to the three-factor model for both equally and value-weighted portfolio returns. Third, we provide evidence that unique firms with distinct characteristics comprise the accrual and cash flow hedge portfolios. Although negatively related, the extreme accrual and cash flow deciles share less than half of the same firms. The portfolios also display distinct average market values, book-to-market trends, and levels of persistence. Fourth, we find that excess returns from the accrual hedge derive mainly from the poor performance of firms in the high accrual portfolio, while excess returns are monotonic across cash flow deciles.

We conclude that investors commit a cognitive error when valuing the information contained in current earnings. Financial theory implies that the price of an asset is determined by the discounted present value of its cash flows. However, investors appear to fixate on earnings and fail to fully reflect the information contained in the accruals and

cash flow. Because investors consistently underestimate the long-term persistence of cash earnings, the market undervalues high cash flow firms and overvalues low cash flow firms. By comparison, investors appear to efficiently value the accrual portion of earnings, except for firms with the highest level of accruals. These firms are more likely to have managed the discretionary portion of their current earnings. Since the high accrual portfolio is consistently overvalued, the market actually seems to reward firms for engaging in earnings management.

Finally, we demonstrate that the accrual and cash flow variables reveal unique information about the quality of current earnings. The imperfect correlation between these components implies that merging the hedge portfolios will provide even greater excess returns. A long position in the high earnings quality portfolio along with an equal short position in the low earnings quality portfolio generate an excess return of almost 16.0 percent per year. While investors fixate on current earnings, they fail to account for the underlying quality of those earnings. The market underestimates the transitory nature of accruals and the long-term persistence of cash flows.

## APPENDIX
## Definition and Measurement of Accounting Variables

Variable definitions are based on Sloan [1996]. The sample only includes firms with available Compustat information, CRSP returns data, and December 31 fiscal year-ends. Variables are measured for each available firm year during the 1963-1993 sample period. Earnings, accruals, and cash flows are divided by average total assets to minimize scale differences. Compustat data item numbers are included in parenthesis.

Earnings = operating income after depreciation (#178) scaled by average total assets

Accruals = [(ΔCA - ΔCash) – (ΔCL - ΔSTD - ΔTP) – DEP] scaled by average total assets

where ΔCA = change in current assets (#4)
ΔCash = change in cash/cash equivalents (#1)
ΔCL = change in current liabilities (#5)
ΔSTD = change in debt included in current liabilities (#34)
ΔTP = change in income taxes payable (#71)
DEP = depreciation and amortization (#14)

Cash Flows = earnings minus accruals

Book Value = common stockholders equity (#60)

Market Value = common shares outstanding (#25) times December 31 share price (#199)

Average TA = average of the beginning and end of the year book value of total assets (#6)

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Table 1. *Average Accruals, Cash Flows, Earnings, Market Value, and Book-to-Market Ratio of Portfolios Formed on Accruals and Cash Flows, 1963-1993*

| | Decile | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Low | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | High |
| *Panel A: Accrual Deciles, NYSE and Amex Firms Only (N = 30,917)* | | | | | | | | | | |
| Accruals | -0.16 | -0.09 | -0.06 | -0.05 | -0.03 | -0.02 | -0.01 | 0.01 | 0.04 | 0.13 |
| Cash Flows | 0.22 | 0.17 | 0.16 | 0.15 | 0.14 | 0.13 | 0.12 | 0.10 | 0.08 | -0.01 |
| Earnings | 0.06 | 0.09 | 0.10 | 0.11 | 0.10 | 0.11 | 0.11 | 0.12 | 0.12 | 0.13 |
| Market Value | 3.91 | 4.77 | 5.17 | 5.26 | 5.22 | 5.22 | 5.06 | 4.88 | 4.63 | 4.16 |
| BE/ME | 1.01 | 1.04 | 1.01 | 1.00 | 1.01 | 0.99 | 0.99 | 0.96 | 0.92 | 0.86 |
| *Panel B: Accrual Deciles, NYSE, Amex, and Nasdaq Firms (N = 50,928)* | | | | | | | | | | |
| Accruals | -0.17 | -0.09 | -0.06 | -0.05 | -0.03 | -0.02 | -0.01 | 0.01 | 0.04 | 0.14 |
| Cash Flows | 0.20 | 0.16 | 0.15 | 0.14 | 0.13 | 0.12 | 0.10 | 0.09 | 0.07 | -0.03 |
| Earnings | 0.03 | 0.08 | 0.09 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.11 | 0.11 |
| Market Value | 3.30 | 4.24 | 4.62 | 4.77 | 4.75 | 4.73 | 4.56 | 4.45 | 4.18 | 3.61 |
| BE/ME | 0.96 | 1.02 | 1.01 | 1.00 | 1.00 | 0.98 | 0.99 | 0.96 | 0.91 | 0.79 |
| *Panel C: Cash Flow Deciles, NYSE and Amex Firms Only (N = 30,917)* | | | | | | | | | | |
| Accruals | 0.09 | 0.01 | -0.01 | -0.02 | -0.03 | -0.03 | -0.04 | -0.05 | -0.06 | -0.09 |
| Cash Flows | -0.08 | 0.03 | 0.07 | 0.09 | 0.12 | 0.14 | 0.16 | 0.19 | 0.22 | 0.33 |
| Earnings | 0.01 | 0.04 | 0.06 | 0.08 | 0.09 | 0.10 | 0.12 | 0.13 | 0.16 | 0.23 |
| Market Value | 3.82 | 4.25 | 4.46 | 4.71 | 4.91 | 5.06 | 5.23 | 5.20 | 5.28 | 5.33 |
| BE/ME | 1.17 | 1.28 | 1.20 | 1.11 | 1.07 | 0.97 | 0.90 | 0.83 | 0.72 | 0.54 |
| *Panel D: Cash Flow Deciles, NYSE, Amex, and Nasdaq Firms (N = 50,928)* | | | | | | | | | | |
| Accruals | 0.07 | 0.01 | -0.01 | -0.02 | -0.03 | -0.03 | -0.04 | -0.05 | -0.06 | -0.09 |
| Cash Flows | -0.11 | 0.03 | 0.07 | 0.09 | 0.12 | 0.14 | 0.16 | 0.19 | 0.22 | 0.33 |
| Earnings | -0.03 | 0.04 | 0.06 | 0.07 | 0.09 | 0.10 | 0.12 | 0.13 | 0.16 | 0.23 |
| Market Value | 3.25 | 3.90 | 4.05 | 4.23 | 4.45 | 4.60 | 4.76 | 4.72 | 4.77 | 4.74 |
| BE/ME | 1.01 | 1.21 | 1.19 | 1.11 | 1.06 | 0.98 | 0.91 | 0.83 | 0.73 | 0.54 |

The sample includes only firms with available Compustat information, CRSP returns data, and December 31 fiscal year-ends. Accrual portfolios (accruals scaled by average total assets) and cash flow portfolios (operating cash flows scaled by average total assets) are formed separately on April 30 of year *t+1* (1963 to 1993) by sorting all NYSE/Amex firms into ten equal groups. Nasdaq firms are added to the deciles using the NYSE/Amex-determined cutoffs. Except for market value, outliers are winsorized at the 1 percent and 99 percent levels. Market value is the natural log of firm size (number of shares outstanding times price, in millions of dollars) on December 31 of year *t*. BE/ME is the book-to-market ratio based on fiscal year-end book value and December 31 of year *t* market value. Each firm year is weighted equally within the deciles.

Table 2. *Number of Firms Categorized by Accrual and Cash Flow Deciles, 1963-1993*

| Accrual | Cash Flow Decile | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Decile | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| *Panel A: All Firms, 1963-1993 (N = 50,928)* | | | | | | | | | | |
| 1 | 631 | 251 | 226 | 244 | 235 | 320 | 391 | 609 | 977 | 2131 |
| 2 | 292 | 177 | 254 | 324 | 355 | 443 | 631 | 782 | 841 | 703 |
| 3 | 255 | 217 | 323 | 393 | 479 | 543 | 650 | 654 | 601 | 521 |
| 4 | 225 | 266 | 368 | 481 | 476 | 588 | 552 | 573 | 461 | 444 |
| 5 | 233 | 389 | 448 | 548 | 543 | 584 | 526 | 428 | 360 | 296 |
| 6 | 305 | 512 | 642 | 568 | 598 | 508 | 416 | 354 | 283 | 305 |
| 7 | 530 | 716 | 710 | 616 | 544 | 460 | 332 | 318 | 274 | 254 |
| 8 | 707 | 1083 | 693 | 553 | 477 | 373 | 278 | 247 | 269 | 284 |
| 9 | 1338 | 1230 | 707 | 520 | 370 | 337 | 276 | 232 | 283 | 251 |
| 10 | 3907 | 981 | 546 | 361 | 227 | 182 | 188 | 161 | 160 | 220 |
| Total | 8423 | 5822 | 4917 | 4608 | 4304 | 4338 | 4240 | 4358 | 4509 | 5409 |
| *Panel B: NYSE and Amex Firms Only, 1963-1993 (N = 30,917)* | | | | | | | | | | |
| 1 | 80 | 87 | 95 | 102 | 116 | 178 | 237 | 383 | 641 | 1144 |
| 2 | 73 | 89 | 147 | 203 | 244 | 289 | 470 | 583 | 582 | 410 |
| 3 | 52 | 109 | 192 | 251 | 346 | 414 | 487 | 489 | 425 | 326 |
| 4 | 64 | 145 | 233 | 343 | 359 | 461 | 442 | 429 | 335 | 283 |
| 5 | 65 | 219 | 304 | 408 | 431 | 463 | 425 | 319 | 267 | 179 |
| 6 | 104 | 288 | 427 | 434 | 474 | 393 | 299 | 275 | 213 | 199 |
| 7 | 162 | 365 | 478 | 450 | 442 | 350 | 251 | 223 | 203 | 166 |
| 8 | 257 | 615 | 480 | 387 | 331 | 275 | 202 | 165 | 184 | 189 |
| 9 | 590 | 671 | 442 | 323 | 238 | 202 | 177 | 140 | 164 | 149 |
| 10 | 1620 | 504 | 291 | 190 | 98 | 82 | 92 | 89 | 76 | 80 |
| Total | 3067 | 3092 | 3089 | 3091 | 3079 | 3107 | 3082 | 3095 | 3090 | 3125 |
| *Panel C: Nasdaq Firms Only, 1973-1993 (N = 20,011)* | | | | | | | | | | |
| 1 | 551 | 164 | 131 | 142 | 119 | 142 | 154 | 226 | 336 | 987 |
| 2 | 219 | 88 | 107 | 121 | 111 | 154 | 161 | 199 | 259 | 293 |
| 3 | 203 | 108 | 131 | 142 | 133 | 129 | 163 | 165 | 176 | 195 |
| 4 | 161 | 121 | 135 | 138 | 117 | 127 | 110 | 144 | 126 | 161 |
| 5 | 168 | 170 | 144 | 140 | 112 | 121 | 101 | 109 | 93 | 117 |
| 6 | 201 | 224 | 215 | 134 | 124 | 115 | 117 | 79 | 70 | 106 |
| 7 | 368 | 351 | 232 | 166 | 102 | 110 | 81 | 95 | 71 | 88 |
| 8 | 450 | 468 | 213 | 166 | 146 | 98 | 76 | 82 | 85 | 95 |
| 9 | 748 | 559 | 265 | 197 | 132 | 135 | 99 | 92 | 119 | 102 |
| 10 | 2287 | 477 | 255 | 171 | 129 | 100 | 96 | 72 | 84 | 140 |
| Total | 5356 | 2730 | 1828 | 1517 | 1225 | 1231 | 1158 | 1263 | 1419 | 2284 |

The table lists the number of firm-year observations cross-ranked into accrual and cash flow deciles. The sample includes only firms with available Compustat information, CRSP

returns data, and December 31 fiscal year-ends. Accrual portfolios (accruals scaled by average total assets) and cash flow portfolios (operating cash flows scaled by average total assets) are formed separately on April 30 of year $t+1$ (1963 to 1993) by sorting all NYSE/Amex firms into ten equal groups. Nasdaq firms are added to the deciles using the NYSE/Amex-determined cutoffs.

Table 3. *The Persistence of Accrual and Cash Flow Decile Rankings*

| Year 0 | Year +1 Decile | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Decile | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
| *Panel A: Percentage of Firms by Accrual Decile, 1963-1992 (N=45,597)* | | | | | | | | | | | |
| 1 | 28.6 | 13.9 | 8.6 | 6.5 | 5.2 | 4.4 | 4.7 | 5.6 | 7.1 | 15.4 | 100.0 |
| 2 | 16.4 | 17.2 | 13.5 | 10.5 | 8.3 | 6.4 | 6.5 | 5.6 | 7.9 | 7.6 | 100.0 |
| 3 | 10.9 | 15.1 | 15.6 | 11.7 | 9.4 | 8.5 | 7.3 | 6.4 | 7.7 | 7.3 | 100.0 |
| 4 | 8.1 | 10.3 | 12.6 | 13.0 | 12.7 | 11.2 | 9.7 | 7.9 | 7.8 | 6.7 | 100.0 |
| 5 | 6.4 | 8.0 | 10.7 | 13.1 | 13.6 | 12.4 | 10.7 | 9.8 | 8.9 | 6.4 | 100.0 |
| 6 | 5.7 | 6.7 | 8.7 | 11.2 | 12.4 | 14.5 | 12.5 | 10.9 | 10.0 | 7.4 | 100.0 |
| 7 | 5.9 | 6.4 | 7.3 | 8.4 | 10.5 | 12.6 | 14.5 | 13.8 | 11.7 | 8.8 | 100.0 |
| 8 | 6.4 | 5.9 | 6.9 | 7.1 | 7.7 | 9.7 | 14.1 | 16.8 | 15.7 | 9.8 | 100.0 |
| 9 | 8.7 | 6.6 | 7.0 | 6.4 | 7.1 | 8.0 | 10.6 | 14.0 | 16.4 | 15.2 | 100.0 |
| 10 | 15.9 | 6.4 | 5.4 | 4.5 | 4.5 | 5.3 | 6.4 | 8.1 | 13.8 | 29.6 | 100.0 |
| *Panel B: Percentage of Firms by Cash Flow Decile, 1963-1992 (N=45,597)* | | | | | | | | | | | |
| 1 | 44.7 | 17.4 | 9.0 | 6.0 | 4.3 | 3.8 | 3.1 | 3.1 | 3.1 | 5.4 | 100.0 |
| 2 | 22.3 | 28.2 | 16.8 | 8.7 | 6.2 | 4.7 | 3.6 | 3.4 | 3.2 | 3.2 | 100.0 |
| 3 | 14.1 | 18.2 | 19.7 | 15.1 | 9.7 | 6.8 | 5.1 | 4.2 | 4.0 | 3.1 | 100.0 |
| 4 | 10.2 | 11.6 | 14.7 | 18.1 | 13.4 | 10.5 | 7.6 | 6.5 | 4.1 | 3.5 | 100.0 |
| 5 | 7.6 | 8.5 | 10.4 | 13.7 | 17.2 | 15.0 | 10.2 | 8.4 | 5.1 | 3.8 | 100.0 |
| 6 | 6.0 | 5.6 | 8.3 | 10.5 | 13.8 | 18.0 | 15.6 | 10.5 | 7.2 | 4.4 | 100.0 |
| 7 | 5.2 | 5.1 | 6.3 | 8.9 | 9.8 | 14.9 | 18.1 | 16.0 | 10.0 | 5.6 | 100.0 |
| 8 | 5.3 | 4.8 | 4.5 | 6.0 | 8.0 | 10.8 | 14.4 | 19.7 | 17.0 | 9.6 | 100.0 |
| 9 | 4.7 | 3.7 | 3.9 | 5.3 | 6.2 | 7.2 | 10.8 | 15.8 | 24.7 | 17.7 | 100.0 |
| 10 | 7.4 | 3.2 | 3.2 | 3.2 | 3.4 | 3.6 | 4.9 | 7.7 | 16.5 | 47.0 | 100.0 |

The table lists the percentage of firms that fall within each year *t+1* decile given the year *t* rankings. The sample includes only firms with available Compustat information, CRSP returns data, and December 31 fiscal year-ends. Accrual portfolios (accruals scaled by average total assets) and cash flow portfolios (operating cash flows scaled by average total assets) are formed separately on April 30 of year *t+1* (1963 to 1993) by sorting all NYSE/Amex firms into ten equal groups. Nasdaq firms are added to the deciles using the NYSE/Amex-determined cutoffs.

Table 4. *Mean and Median Annual Returns for the Three Years After Accrual and Cash Flow Portfolio Formation, 1963-1993*

| | Year *t+1* | | Year *t+2* | | Year *t+3* | |
|---|---|---|---|---|---|---|
| Portfolio | Mean | Median | Mean | Median | Mean | Median |
| *Panel A: Accrual Deciles, All Firms (NYSE, Amex, and Nasdaq)* | | | | | | |
| Low | 0.184 | 0.138 | 0.169 | 0.142 | 0.192 | 0.157 |
| 2 | 0.162 | 0.158 | 0.167 | 0.212 | 0.166 | 0.169 |
| 3 | 0.172 | 0.172 | 0.159 | 0.155 | 0.147 | 0.148 |
| 4 | 0.175 | 0.187 | 0.159 | 0.164 | 0.171 | 0.156 |
| 5 | 0.158 | 0.165 | 0.159 | 0.165 | 0.158 | 0.165 |
| 6 | 0.150 | 0.160 | 0.155 | 0.159 | 0.163 | 0.156 |
| 7 | 0.170 | 0.162 | 0.162 | 0.141 | 0.161 | 0.175 |
| 8 | 0.147 | 0.178 | 0.155 | 0.158 | 0.164 | 0.174 |
| 9 | 0.155 | 0.133 | 0.152 | 0.162 | 0.161 | 0.127 |
| High | 0.102 | 0.055 | 0.127 | 0.089 | 0.150 | 0.113 |
| Low-High Hedge | 0.082 | 0.083 | 0.042 | 0.053 | 0.042 | 0.044 |
| *Panel B: Cash Flow Deciles, All Firms (NYSE, Amex, and Nasdaq)* | | | | | | |
| Low | 0.104 | 0.088 | 0.118 | 0.090 | 0.157 | 0.087 |
| 2 | 0.151 | 0.144 | 0.159 | 0.140 | 0.163 | 0.159 |
| 3 | 0.154 | 0.151 | 0.157 | 0.142 | 0.170 | 0.153 |
| 4 | 0.164 | 0.163 | 0.174 | 0.179 | 0.154 | 0.170 |
| 5 | 0.155 | 0.185 | 0.153 | 0.157 | 0.163 | 0.143 |
| 6 | 0.166 | 0.176 | 0.176 | 0.183 | 0.169 | 0.149 |
| 7 | 0.157 | 0.171 | 0.176 | 0.166 | 0.158 | 0.169 |
| 8 | 0.177 | 0.186 | 0.142 | 0.165 | 0.165 | 0.173 |
| 9 | 0.189 | 0.180 | 0.167 | 0.185 | 0.159 | 0.152 |
| High | 0.186 | 0.184 | 0.160 | 0.154 | 0.178 | 0.164 |
| High-Low Hedge | 0.082 | 0.102 | 0.042 | 0.064 | 0.021 | 0.077 |

The sample includes only firms with available Compustat information, CRSP returns data, and December 31 fiscal year-ends. Accrual portfolios (accruals scaled by average total assets) and cash flow portfolios (operating cash flows scaled by average total assets) are formed separately on April 30 of year *t+1* (1963 to 1993) by sorting all NYSE/Amex firms into ten equal groups. Nasdaq firms are added to the deciles using the NYSE/Amex-determined cutoffs. The raw returns for each firm year are weighted equally within the reported decile averages. One-year buy-and-hold returns (including all distributions) are calculated from May 1 to April 30 for year *t+1, t+2,* and *t+3* for each December 31 fiscal year end (year *t*). If a firm delists before the end of the cohort year, the valued-weighted NYSE/Amex/Nasdaq index is spliced in on a point-forward basis. The hedge portfolio of Panel A is created by holding a long position in firms from the low accrual decile while simultaneously shorting firms in the high accrual decile at the time of portfolio formation. In Panel B, the hedge portfolio involves a long position in firms with the highest cash flows and a short position in firms with the lowest cash flows.

Table 5. *Monthly Time-Series Regressions of Returns on Market Risk, Size, and Book-to-Market Ratio for Accrual Portfolios*

$$r_{pt} - r_{ft} = a + b(r_{mt} - r_{ft}) + sSMB_t + hHML_t + e_{pt}$$

| Accrual Portfolio | a | b | s | h | Adj. $R^2$ |
|---|---|---|---|---|---|
| *Panel A: Equally Weighted Portfolios* | | | | | |
| Low | 0.15 | 0.97 | 1.26 | 0.37 | 0.90 |
| | (1.33) | (34.58) | (31.75) | (8.01) | |
| 2 | 0.06 | 1.00 | 0.90 | 0.34 | 0.93 |
| | (0.77) | (49.04) | (30.99) | (10.14) | |
| 9 | -0.02 | 1.03 | 0.96 | 0.22 | 0.96 |
| | (-0.34) | (61.75) | (40.37) | (8.08) | |
| High | -0.53 | 1.06 | 1.29 | 0.13 | 0.94 |
| | (-5.67) | (45.53) | (38.77) | (3.51) | |
| Hedge (Low-High) | 0.68 | -0.09 | -0.02 | 0.23 | 0.13 |
| | (5.78) | (-3.22) | (-0.54) | (4.85) | |
| *Panel B: Value-Weighted Portfolios* | | | | | |
| Low | 0.37 | 0.98 | 0.09 | -0.16 | 0.79 |
| | (2.96) | (31.35) | (2.12) | (-3.07) | |
| 2 | -0.09 | 1.00 | -0.09 | 0.09 | 0.85 |
| | (-0.93) | (41.92) | (-2.79) | (2.19) | |
| 9 | -0.04 | 1.08 | 0.13 | -0.10 | 0.87 |
| | (-0.42) | (42.55) | (3.53) | (-2.51) | |
| High | -0.34 | 1.13 | 0.41 | -0.27 | 0.88 |
| | (-3.05) | (40.54) | (10.33) | (-5.88) | |
| Hedge (Low-High) | 0.72 | -0.15 | -0.32 | 0.11 | 0.13 |
| | (3.89) | (-3.26) | (-4.85) | (1.49) | |

The sample period is July 1963 to April 1994 (370 months). Only firms with available Compustat information, CRSP returns data, and December 31 fiscal year-ends are included in the sample. Accrual portfolios (accruals scaled by average total assets) are formed on April 30 of year *t+1* (1963 to 1993) by sorting all NYSE/Amex firms into ten equal groups. Nasdaq firms are added to the deciles using the NYSE/Amex-determined cutoffs. A monthly Fama and French (1993) three-factor regression is conducted for each decile portfolio. The regression model includes factors for market risk (beta), firm size, and book-to-market ratio. Equally weighted portfolio regression results are reported in Panel A, and value-weighted regression results are provided in Panel B. The t-statistics are in parenthesis.

Table 6. *Monthly Time-Series Regressions of Returns on Market Risk, Size, and Book-to-Market Ratio for Cash Flow Portfolios*

$$r_{pt} - r_{ft} = a + b(r_{mt} - r_{ft}) + sSMB_t + hHML_t + e_{pt}$$

| Cash Flow Portfolio | a | b | s | h | Adj. $R^2$ |
|---|---|---|---|---|---|
| *Panel A: Equally Weighted Portfolios* | | | | | |
| Low | -0.52 | 1.02 | 1.42 | 0.38 | 0.90 |
| | (-4.28) | (33.97) | (33.97) | (7.68) | |
| 2 | -0.11 | 1.02 | 1.04 | 0.40 | 0.93 |
| | (-1.25) | (48.55) | (34.57) | (11.54) | |
| 9 | 0.29 | 0.97 | 0.75 | 0.13 | 0.96 |
| | (5.04) | (67.97) | (36.72) | (5.64) | |
| High | 0.36 | 0.97 | 0.73 | -0.01 | 0.95 |
| | (5.39) | (59.18) | (31.19) | (-0.54) | |
| Hedge (High-Low) | 0.87 | -0.05 | -0.69 | -0.39 | 0.47 |
| | (7.05) | (-1.71) | (-15.80) | (-7.80) | |
| *Panel B: Value-Weighted Portfolios* | | | | | |
| Low | -0.50 | 1.15 | 0.52 | 0.17 | 0.83 |
| | (-3.76) | (34.45) | (11.06) | (3.11) | |
| 2 | -0.07 | 1.12 | 0.21 | 0.14 | 0.84 |
| | (-0.58) | (37.96) | (5.09) | (2.80) | |
| 9 | 0.21 | 1.00 | -0.10 | -0.12 | 0.89 |
| | (2.43) | (46.81) | (-3.36) | (-3.44) | |
| High | 0.27 | 0.93 | -0.10 | -0.30 | 0.89 |
| | (3.34) | (45.99) | (-3.34) | (-9.04) | |
| Hedge (High-Low) | 0.78 | -0.22 | -0.62 | -0.47 | 0.36 |
| | (4.70) | (-5.38) | (-10.62) | (-6.97) | |

The sample period is July 1963 to April 1994 (370 months). Only firms with available Compustat information, CRSP returns data, and December 31 fiscal year-ends are included in the sample. Cash flow portfolios (operating cash flows scaled by average total assets) are formed on April 30 of year *t+1* (1963 to 1993) by sorting all NYSE/Amex firms into ten equal groups. Nasdaq firms are added to the deciles using the NYSE/Amex-determined cutoffs. A monthly Fama and French (1993) three-factor regression is conducted for each decile portfolio. The regression model includes factors for market risk (beta), firm size, and book-to-market ratio. Equally weighted portfolio regression results are reported in Panel A, and value-weighted portfolio results are provided in Panel B. The t-statistics are in parenthesis.

Table 7. *Monthly Time-Series Regressions of Returns on Market Risk, Size, and Book-to-Market Ratio for Cash Flow and Earnings Portfolios*

$$r_{pt} - r_{ft} = a + b(r_{mt} - r_{ft}) + sSMB_t + hHML_t + e_{pt}$$

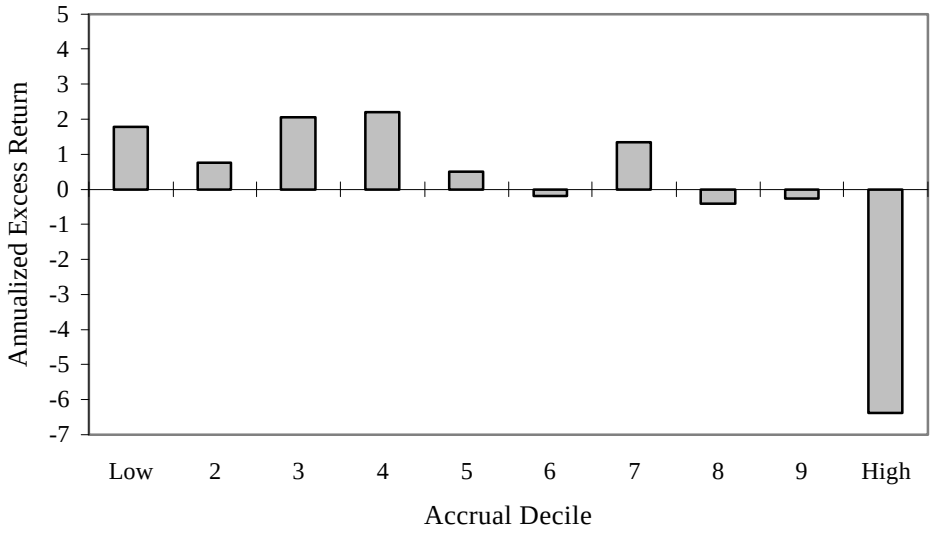
| Portfolio | a | b | s | h | Adj. $R^2$ |
|---|---|---|---|---|---|
| *Panel A: Equally Weighted Portfolios* | | | | | |
| (1) Low Cash Flow Low Earnings | -0.43 | 1.00 | 1.42 | 0.42 | 0.88 |
| | (-3.16) | (29.99) | (29.86) | (7.56) | |
| (2) Low Cash Flow High Earnings | -0.99 | 1.06 | 1.41 | 0.13 | 0.81 |
| | (-5.42) | (23.42) | (21.85) | (1.75) | |
| (3) High Cash Flow Low Earnings | 0.34 | 0.97 | 1.47 | 0.42 | 0.61 |
| | (1.19) | (13.72) | (14.55) | (3.61) | |
| (4) High Cash Flow High Earnings | 0.37 | 0.98 | 0.64 | -0.07 | 0.96 |
| | (6.11) | (64.55) | (29.86) | (-2.95) | |
| (5) Hedge Portfolio (3-2) | 1.33 | 0.09 | -0.06 | -0.29 | 0.02 |
| | (4.25) | (1.15) | (-0.53) | (-2.27) | |
| *Panel B: Value-Weighted Portfolios* | | | | | |
| (1) Low Cash Flow Low Earnings | -0.49 | 1.12 | 0.49 | 0.24 | 0.80 |
| | (-3.37) | (31.41) | (9.57) | (4.13) | |
| (2) Low Cash Flow High Earnings | -0.62 | 1.29 | 0.90 | -0.21 | 0.75 |
| | (-2.74) | (23.15) | (11.36) | (-2.26) | |
| (3) High Cash Flow Low Earnings | 0.58 | 1.12 | 0.83 | -0.16 | 0.58 |
| | (2.05) | (15.89) | (8.32) | (-1.37) | |
| (4) High Cash Flow High Earnings | 0.26 | 0.92 | -0.10 | -0.30 | 0.89 |
| | (3.10) | (45.05) | (-3.39) | (-8.96) | |
| (5) Hedge Portfolio (3-2) | 1.20 | 0.18 | 0.07 | -0.05 | 0.01 |
| | (3.34) | (2.00) | (0.57) | (-0.34) | |

The sample period is July 1963 to April 1994 (370 months) and includes only firms with available Compustat information, CRSP returns data, and December 31 fiscal year-ends. Cash flow portfolios (operating cash flow scaled by average total assets) are formed on April 30 of year *t+1* (1963 to 1993) by sorting all NYSE/Amex firms into ten equal groups. Then, all NYSE/Amex firms are divided into two groups (Low and High) on the basis of earnings scaled by average total assets. Nasdaq firms are added to the cash flow and earnings portfolios using the NYSE/Amex-determined cutoffs. Fama and French (1993) three-factor regressions are conducted for each portfolio on monthly factors for market risk (beta), firm size, and book-to-market ratio. The hedge portfolio contains a short position in the low cash flow, high earnings portfolio and a long position in the high cash flow, low earnings portfolio. Equally weighted portfolio regression results are reported in Panel A, and value-weighted portfolio results are provided in Panel B. The t-statistics are in parenthesis.

**FIGURE 1**
**Annualized Excess Returns of Equally Weighted Accrual and Cash Flow Portfolios**

The sample period is July 1963 to April 1994 (370 months) and only includes firms with available Compustat information, CRSP returns data, and December 31 fiscal year-ends. Accrual portfolios and cash flow portfolios are formed separately on April 30 of year *t+1* (1963 to 1993) by sorting all NYSE/Amex firms into ten equal groups. Nasdaq firms are added to the deciles using the NYSE/Amex-determined cutoffs. Fama and French [1993] three-factor regressions are conducted for each decile portfolio. Excess returns are measured by multiplying the regression intercepts by 12.

*Panel A: Equally Weighted Annualized Excess Returns for Accrual Deciles*




*Panel B: Equally Weighted Annualized Excess Returns for Cash Flow Deciles*

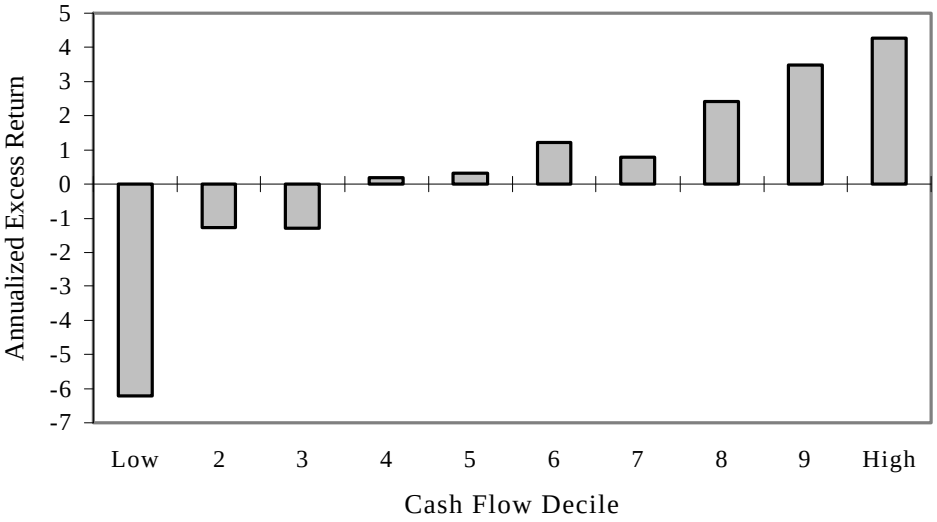


**FIGURE 2**
**Construction of the Earnings Quality Hedge**

Accrual portfolios and cash flow portfolios are formed separately on April 30 of year *t+1* (1963 to 1993) by sorting all NYSE and Amex firms into ten equal groups. Nasdaq firms are added to the deciles using the NYSE/Amex-determined cutoffs. Earnings portfolios are also formed each April 30 by dividing all NYSE and Amex firms into two equal groups (low and high) on the basis of earnings scaled by average total assets. Nasdaq firms are then added according to the median NYSE/Amex-determined cutoffs. Merging the earnings portfolios with the existing accrual or cash flow deciles produces 20 new cross-sectional portfolios. The hedge holds a long position in the high earnings quality portfolio and a short position in the low earnings quality portfolio.

*Panel A: Sorting by Accruals and Earnings*

| | Low Accruals | High Accruals |
|---|---|---|
| Low Earnings | ⇒ High or Low Cash Flow | ⇒ Low Cash Flow<br>Low Earnings Quality<br>**SELL** |
| High Earnings | ⇒ High Cash Flow<br>High Earnings Quality<br>**BUY** | ⇒ High or Low Cash Flow |

*Panel B: Sorting by Cash Flows and Earnings*

| | Low Cash Flow | High Cash Flow |
|---|---|---|
| Low Earnings | ⇒ High or Low Accruals | ⇒ Low Accruals<br>High Earnings Quality<br>**BUY** |
| High Earnings | ⇒ High Accruals<br>Low Earnings Quality<br>**SELL** | ⇒ High or Low Accruals |

**FIGURE 3**
**Returns from the Cash Flow and Earnings-Based Trading Strategy by Calendar Year**

The sample period is 1963 to 1993 and only includes firms with available Compustat information, CRSP returns data, and December 31 fiscal year-ends. Cash flow deciles (operating cash flow scaled by average total assets) are formed on April 30 of year *t+1* by sorting all NYSE/Amex firms into ten equal groups. Then, all NYSE/Amex firms are divided into two groups (Low and High) on the basis of earnings scaled by average total assets. Nasdaq firms are added to the cash flow and earnings portfolios using the NYSE/Amex-determined cutoffs. The hedge portfolio contains a long position in the high cash flow, low earnings portfolio and an equal short position in the low cash flow, high earnings portfolio. Raw portfolio returns for each year are measured over a one-year holding period.