The Variation of Momentum Profitability across Accrual Groups *

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Abstract

We establish a robust link between momentum and accruals. Momentum profitability is statistically significant and economically large only among firms with high accruals. Cross-sectional characteristics of momentum previously documented do not subsume the effect of accruals on momentum. Loser stocks with high accruals experience significant decreases in industry-adjusted sales growth and the largest amount of income-decreasing special items in subsequent years. Most of momentum profit among high-accrual firms is attributable to the high discretionary accrual group. Our findings indicate that due to the joint force of earnings overestimation and earnings manipulation, the downward payoff of loser stocks with high accruals largely drives the accrual-based momentum profit.

JEL classification: G1, M4
Keywords: momentum, accruals, earnings overestimation, earnings manipulation

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Abstract

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Introduction

Price momentum and accrual anomalies are two well-documented financial phenomena (see Jegadeesh and Titman, 1993; and Sloan, 1996). Fama and French (2008) highlight the pervasive effects of accruals and momentum. They demonstrate that the returns associated with accruals and momentum remain strong and robust in all size groups, cross-sectional regressions, and tests based on different portfolio sorting methods. To date, no attempt has been made to empirically connect these two anomalies.[1] This paper fills in this gap in the literature by investigating the effect of accruals on momentum to understand the profitability of momentum strategies. We raise three empirical questions. First, are accruals related to momentum? Second, if so, can we use accrual-based variables to explain momentum profits? Third, why is it important to examine how accruals impact the profitability of momentum strategies?

Jegadeesh and Titman (1993) first document that momentum trading strategies of buying past winners and selling past losers generate statistically significant and economically large profits. Fama and French (1996) show that their three-factor model (Fama and French, 1993) does not explain momentum. A variety of explanations, both risk-based and behavioral, have been proposed to unravel this anomaly. Several works demonstrate the significance of momentum for stocks with certain characteristics in both cross-sectional and time series analyses.[2]

Accruals are defined as the difference between accounting earnings and cash flows.

[1] Chan, Jegadeesh, and Lakonishok (1996) show that past earnings surprises and past stock returns have independent explanatory power for future returns. Chordia and Shivakumar (2006) indicate that price momentum is captured by the systematic component of earnings momentum. Collins and Hribar (2000) find that the accrual mispricing is distinct from post-earnings announcement drift.

[2] Risk-based explanations include Berk, Green and Naik (1999), Ahn, Conrad and Dittmar (2003), Grinblatt and Moskowitz (2004), Korajczyk and Sadka (2004), Lesmond, Schill and Zhou (2004), Sagi and Seasholes (2007), Chen, Novy-Marx and Zhang (2011), and Wang and Wu (2011). Behavioral explanations include Barberis, Shleifer and Vishny (1998), Daniel, Hirshleifer and Subrahmanyam (1998), and Hong and Stein (1999). Characteristics-based analyses include Asness (1997), Hong, Lim and Stein (2000), Lee and Swaminathan (2000), Chordia and Shivakumar (2002), Cooper, Gutierrez and Hameed (2004), Zhang (2006), Sadka (2006), Avramov, et al. (2007, 2013), Antoniou, Doukas and Subrahmanyam (2011), and Garlappi and Yan (2011).

Dechow (1994) states that the primary role of accruals is to overcome problems with measuring firm performance when firms are in continuous operation. However, the use of accruals introduces new problems, such as managerial discretion over the recognition of accruals. Managers can use accruals to signal their private information or to opportunistically manipulate earnings. Because investors fixate on reported earnings, they may be misled temporarily and induced to misvalue stocks.[3] Sloan (1996) first documents the accrual anomaly: firms with high accruals underperform firms with low accruals. The literature has since broadly used accrual-based variables as proxies for managerial manipulation, or for market misvaluation.[4]

Recent research considers accruals as an important indicator related to earnings quality that is useful for equity valuation (see, e.g., Richardson, et al., 2005; and Chan, et al., 2006). Earnings increases usually go along with high accruals that suggest low earnings quality followed by poor future returns. This paper argues that accruals may have a distinctively predictive power for future stock returns because they contain information on both earnings manipulation and misvaluation. We focus on how price continuation following the release of public earnings information varies with accruals. We demonstrate that higher accruals lead to lower future returns for loser stocks but not higher future returns for winner stocks, suggesting that accruals may only delay the incorporation of certain information (mostly bad news) into stock prices. The significant accrual-based momentum profit implies the robust effect of accruals and sheds light on the contribution of accruals to momentum profitability.

We find that momentum profitability is statistically significant and economically large

[3] For instance, the second largest accounting fraud in US history – the WorldCom scandal, is a case of earnings manipulation through adjusting accruals. WorldCom's improper accounting includes two principal types: reduced reported line costs and exaggerated reported revenues. From the second quarter of 1999 through the first quarter of 2002, WorldCom improperly reduced its reported line costs (and increased pretax income) by over $7 billion.

[4] See, e.g., Subramanyam (1996), Teoh, Welch and Wong (1998a, b), Collins and Hribar (2000), Xie (2001), Richardson, et al. (2005), Thomas and Zhang (2002), Chan, et al. (2006), Kothari, Loutskina and Nikolaev (2008), and Gong, Louis and Sun (2008).

only among high-accrual firms but is nonexistent or much weaker for firms with low- and medium-levels of accruals. More specifically, the strategies that sequentially sort on accruals and then on past six-month returns yield momentum profits that increase monotonically with accruals; the equally-/value-weighted average (EW/VW) payoffs increase from an insignificant 0.26%/0.45% per month for the low-accrual group to a significant 1.37%/1.29% per month for the high-accrual group. The discrepancy in EW/VW payoffs from the loser stocks among the three accrual groups (1.29%/0.83%, 1.11%/0.72% and 0.13%/-0.03% per month for low-, medium- and high-accrual groups, respectively) implies that the downward payoff of loser stocks with high accruals largely drives the accrual-based momentum profit. The effect of accruals on momentum is generally robust after we control for the time-varying beta, the Fama-French three factors, and Carhart's (1997) four factors, and does not disappear in more recent years. The cross-sectional characteristics of momentum previously documented do not subsume the interaction between accruals and momentum, and the interaction also holds in different market states.

In order to understand the sources of accrual-based momentum, we analyze the predictive power of accruals for stock returns based on two hypotheses -- earnings overestimation and earnings manipulation. Chan, et al. (2006) indicate that changes in accounts receivable, inventories, and accounts payable are three items that contribute most to differentiating accruals across firms. These three dominant components in accruals show that accruals are largely driven by inventories and other working capital items, which in turn tend to rise with sales. If investors extrapolate the past fast-growing trend of firms with high accruals into the future, they may overestimate the persistence in sales growth. Moreover, high accruals can reflect increases in current assets when managers overstate accounts receivable, or decreases

in current liabilities when managers understate accounts payable. Investors, analysts, and the media usually pay more attention to firms' short-term earnings performance. Under these circumstances, there are more incentives for managers to inflate a firm's earnings prospects than to lower current earnings and defer them to the future prospects. Therefore, earnings overestimation and/or traces of manipulation are more likely to be found in firms with high accruals.

We employ three tests to examine the hypotheses. First, we examine the operating performance of the loser and winner stocks in the three accrual groups before and after the portfolio formation. Over the holding periods, the sales growth of high-accrual losers declines significantly while that of the high-accrual winners improves; however, there is no significant decrease in sales growth for loser stocks with low or medium accruals. This implies that investors overestimate the persistence in sales growth of loser stocks with high accruals and supports the earnings overestimation hypothesis. We cannot rule out the existence of earnings manipulation because this misvaluation may be induced by managerial efforts to manipulate earnings and stock prices.

Second, we track special items in pre- and post-formation periods to check the existence of earnings manipulation. Special items are intended to capture the impact of unusual or nonrecurring events on a firm's income statement, such as inventory writedowns. If managers manipulate earnings, the effects will not sustain indefinitely, and corrections are expected to be reported as special items in the following years. In subsequent years, the amount of income-decreasing special items relative to total assets is the largest for the loser firms with high accruals. This test indicates that loser stocks with high accruals are more likely to be manipulated in the pre-formation period and implies the downward payoff of loser stocks in the

post-formation period.

Third, we decompose accruals into nondiscretionary and discretionary components and find that most accrual-based momentum profitability is contributable to the high discretionary accrual group. This evidence provides strong support for the earnings manipulation hypothesis, but weaker support for the earnings overestimation hypothesis.

Due to asymmetric information, i.e., managers know better about their firms than investors, investors are more likely to overestimate the persistence in sales growth for loser stocks with high accruals. Therefore, loser stocks with high accruals are likely more mispriced, resulting in the downward payoff for those stocks. Overall, the effect of accruals on momentum may be attributable to the joint force of earnings manipulation and earnings overestimation.

The remainder of this paper is organized as follows. Section I details the data and summary statistics. Section II presents the empirical results of testing the momentum effect in combination with past returns and accruals. Section III proposes the hypotheses and explores possible explanations for accrual-based momentum profit. Section IV summarizes the results and concludes.

I. Data and Summary Statistics

The sample includes all non-financial firms listed on NYSE/AMEX with monthly return data on the Center for Research in Security Prices (CRSP) and annual accounting data on Compustat from January 1965 to December 2008. Our sample excludes firms that are a foreign firm, a closed-end fund, a real estate investment trust (REIT), or an American Depository Receipt (ADR). We extract monthly returns on all NYSE and AMEX stocks from CRSP database,

based on several selection criteria.[5] The annual financial data required to construct *accruals* are obtained from Compustat. The accrual component of earnings is computed using information from the balance sheet and income statement, consistent with the existing literature on earnings management (see, e.g., Dechow, Sloan, and Sweeney, 1995; and Sloan, 1996):[6]

$$Accruals = (\Delta CA - \Delta Cash) - (\Delta CL - \Delta STD - \Delta TP) - Dep \quad (1)$$

where

ΔCA = change in current assets (Compustat item 4)

$\Delta Cash$ = change in cash (Compustat item 1)

ΔCL = change in current liabilities (Compustat item 5)

ΔSTD = change in debt included in current liabilities (Compustat item 34)

ΔTP = change in income taxes payable (Compustat item 71)

Dep = depreciation and amortization (Compustat item 14)

The measure of earnings is operating income after depreciation before interest expense, taxes and special item (Compustat data item 178). The measure of cash flows is calculated as the difference between earnings and accruals. All three variables-earnings, accruals and cash flows are standardized by firm size to facilitate the empirical analysis, where firm size is measured as the average of the beginning and end of year book value of total assets (Compustat data item 6), as follows:

[5] Both Jegadeesh and Titman (1993) and Sloan (1996) include firms listed on NYSE/AMEX. In order to maintain data consistency, our sample starts in January 1965 and we exclude firms listed on NASDAQ. Like in Jegadeesh and Titman (2001, 2002), to ensure that results are not driven primarily by low priced and illiquid stocks, we adopt the following selection criteria: stocks must have at least six consecutive monthly return observations; and we exclude stocks priced less than $5 at the beginning of the holding period and stocks with market capitalization that would place them in the smallest NYSE decile. Our results are robust to the inclusion of stocks that are listed on NASDAQ, are priced below $5 and belong to the smallest NYSE decile.

[6] Collins and Hribar (2002) argue that accruals based on the balance sheet approach suffer from measurement errors due to mergers and acquisitions and recommend to measure accruals using cash flow statement information. However, the cash flow statement data are available only after 1988. Accordingly, the sample will become much shorter if this alternative measure of accruals is used.

$$\text{Earnings} = \frac{\text{Operating income after depreciation}}{\text{Average total assets}}$$

$$\text{Accrual component} = \frac{\text{Accruals}}{\text{Average total assets}} \qquad (2)$$

$$\text{Cash flow component} = \frac{\text{Operating income after depreciation - Accruals}}{\text{Average total assets}}$$

To make our strategies implementable, we calculate future stock returns that begin four months after the end of the fiscal year from which the financial statement data are gathered. The reason is, by this time, almost all firms' financial statements are publicly available according to Alford, Jones and Zmijewski (1994).[7] After we merge the CRSP with Compustat, the final sample includes 5,195 firms for the period of January 1965 to December 2008.

<Table I>

Panel A of Table I provides descriptive statistics for the distribution of monthly raw returns of the full sample. For instance, the average monthly return is 1.18% and the median size of firms is $552.49 millions. Panel B of Table I shows monthly returns for the loser portfolio (P1), the winner portfolio (P10), and the momentum strategy of buying the winner and selling the loser portfolio (P10−P1), which is created as in Jegadeesh and Titman (1993). At the beginning of each month t, we rank all stocks based on their cumulative returns over the formation period (months t−6 to t-1) and assign them to one of ten portfolios based on their past six-month returns. Then, these portfolios are held for 6 months. In addition, we skip a month between the formation period and the holding period. Each portfolio return is calculated as the equally weighted average return of the stocks in the portfolio. The evidence in Panel B suggests significant momentum profitability in the full sample. In particular, the momentum profit (P10−P1) averages 1.03% (t-stat=5.90) per month, which is statically significant at the 1%

[7] For instance, if a firm's fiscal year ends in month 't', we match the accounting data with CRSP return data from month 't+4' to 't+15'. Furthermore, we consider a one month lag between the formation period and holding period.

level.[8]

<Table II>

Panel A of Table II provides statistics on the characteristics of decile portfolios formed by ranking firms on the magnitude of accrual component of earnings. The firms are sorted and assigned in equal numbers to ten portfolios, A1 to A10, where A1 indicates the lowest accrual group and A10 the highest. The mean value of accrual component is -0.14 for the lowest accrual portfolio and 0.11 for the highest accrual portfolio. There is a strong negative relation between accruals and cash flows. The mean value of cash flows falls from 0.22 for the lowest accrual portfolio to 0.02 for the highest accrual portfolio. In contrast, earnings are positively related to accruals. The mean value of earnings is 0.08 for the lowest accrual portfolio and 0.13 for the highest accrual portfolio. The magnitude of the three measures and their relations are consistent with prior studies (Dechow, 1994; and Sloan, 1996).

Panel B of Table II shows monthly returns for the lowest accrual portfolio (A1), the highest accrual portfolio (A10), and the profit of buying the lowest accrual portfolio and selling the highest accrual portfolio (A1−A10). At the beginning of each month t, we rank all stocks based on their annual accruals and assign them to one of ten portfolios based on magnitude of their accruals. Then, these portfolios are held for 6 months. We skip a month between the formation period and the holding period. Each portfolio return is calculated in the same way as in Panel B of Table I. Panel B suggests the significantly negative relation between accruals and future stock returns in the first six months in the holding period. In particular, the accrual strategy return to a zero-cost portfolio of taking a long position in the lowest-accrual portfolio and an equally valued short position in the highest-accrual portfolio is 0.49% per month (t-stat

[8] Consistent with Jegadeesh and Titman (1993), momentum profits are prominent in non-January months (1.23% per month with t-stat=7.11) and negative in January months (-1.29% per month with t-stat=-1.68).

=4.06).

Overall, Tables I and II confirm that the full sample generates significantly positive price momentum profits (sorted based on past six-month stock returns) and accrual profits (sorted based on past fiscal year accruals) for the next six-month holding period. It indicates that future stock returns are positively related to past stock returns and negatively related to past accruals.

II. Empirical Results

A. Independent Sorting Based on Past Returns and Accruals

In this subsection, we propose a combined strategy based on both past returns and accruals. For each month t, all stocks are ranked into decile portfolios according to their cumulative past six-month returns. Simultaneously, stocks are also ranked into decile portfolios according to their past fiscal year accruals. Decile portfolios are formed monthly and their returns are computed by weighting equally all firms in that decile. The positions are held for the following six months (t+1 through t+6). There is a one month lag between the formation and the holding periods. This independent two-way sorting procedure yields 100 portfolios.

<Table III>

To establish the link between momentum and accruals, we examine the average monthly raw returns of four extreme portfolios in Table III. Portfolio (A1, P1) has the monthly raw return of 1.39%, belonging to both the lowest past six-month returns group and the lowest accrual group. Portfolios (A1, P10), (A10, P1) and (A10, P10) have the monthly raw returns of 1.66%, -0.02% and 1.57%, respectively. We first note that only Portfolio (A10, P1) has a negative (but insignificant) monthly return, while the other three extreme portfolios have significantly positive monthly returns. Next, we examine the trading strategies from these four extreme portfolios.

We observe that the profit is significantly positive at the 1% level (t-stat = 6.80) in the

highest accrual group with monthly raw return 1.59% using strategy1 (A10, P10)-(A10, P1). The momentum strategy in the highest accrual group outperforms the pure price momentum strategy (1.03% per month from Table I) by 0.56% per month. On the other hand, the momentum profit is surprisingly insignificant in the lowest accrual group with monthly raw return 0.27% (t-stat = 0.93). See strategy2, (A1, P10) - (A1, P1). In addition, strategy3 (A1, P10) - (A10, P1) with a long position in the winners with the lowest accruals, and a short position in the losers with the highest accruals generates the highest profit. Comparing with the investment strategy constructed solely on past six-month returns (1.03% per month as in Table I), the combined strategy produces a return of 1.68 percent, which is 0.65% higher than in the previous strategy, and the difference is statistically significant. This result demonstrates the importance of incorporating accruals to improve investors' ability in separating winners from losers.[9]

In summary, the empirical results suggest that the combined strategy (strategy1 in Table III) improves the return to the price momentum by incorporating accruals. More importantly, we find that the momentum profitability is positively significant only in the highest accrual group, while it is insignificant in the lowest accrual group. The findings convince us that accruals may affect price momentum profits. As our conclusions are drawn from four extreme portfolios out of one hundred portfolios in the full sample, one may wonder whether this independent two-way sorting may cause a small sample bias in each extreme portfolio. To address this issue, we examine the effect of accruals on momentum under a sequential sorting procedure in the next subsection.

[9] The difference between strategy3 profit and price momentum profit is 0.65% per month with a t-stat of 3.23.The average monthly return of strategy (A1, P1) - (A10, P1) is 1.41 percent for the loser stocks. The monthly profit of accrual anomaly in the loser stocks is greater than the profit of the one-way accrual sorting strategy (0.49% in Table II panel B). In contrast, accrual anomaly does not exist in the winner stocks. Strategy (A1, P10) - (A10, P10) generates only 0.09% return per month which is statistically insignificant. We leave this effect of momentum on accrual anomaly for future research, as this paper concentrates on explaining the effect of accruals on momentum.

B. Results from Sequential Sorting

From the previous subsection, we find that momentum profit is affected by accruals. There is a significant discrepancy in momentum payoff across different accrual groups. In this subsection, portfolios are formed on a sequential basis, sorting first on accruals and then on past six-month returns. For each month t, all stocks are ranked into three equal groups based on their past fiscal year accruals (A1 for the lowest accruals and A3 for the highest accruals).[10] The stocks in each accrual group are then divided into deciles based on their past six-month returns (P1 for the past loser stocks and P10 for the past winner stocks). The two-step sequential sorting procedure generates 30 accruals - momentum portfolios.

<Table IV>

Panel A of Table IV shows that the payoffs to momentum strategies strongly depend on accruals. For the low- and medium-accrual groups, the average equally-/value-weighted payoffs of P10−P1 strategy are 0.26% / 0.45% (t-stat=1.12/1.61) and 0.36% / 0.54% (t-stat=1.76/1.71) per month, respectively. None of them is statistically significant at the 5% level. The payoff is much larger as well as statistically significant at 1.37% / 1.29% (t-stat=7.26/5.06) for the high-accrual group. This result is consistent with the finding in Table III: momentum effect is significantly positive only in the highest accrual group, while it is insignificant in the lowest accrual group. Moreover, the monthly equally-/value-weighted raw return of loser stocks with high accruals is only 0.13%/-0.03%, which is much lower than the returns of loser stocks with low and medium accruals (1.29%/0.83% and 1.11%/0.72%). However, the monthly raw returns of winner stocks are comparable for all three accrual groups (1.55%/1.27%, 1.47%/1.26% and 1.50%/1.26%) for the low-, medium- and high-accrual groups. The discrepancy in payoff of the

[10] Using this sorting procedure, each accrual group contains more than 800 firms on average across time. This provides a sufficiently large number of firms to rebalance the portfolio at each point in time. Conrad, Cooper, and Kaul (2003) indicate that the procedures that simultaneously condition on two (or more) characteristics may bring potential bias. Our results are robust to the independent two-way sorting procedure.

loser-stock portfolio (P1) among three accrual groups implies that accrual-based momentum profit is largely driven by the downward effect of loser stocks with high accruals.

Panel A of Table IV also provides the percentage of market capitalization represented by each accrual group. The payoffs to momentum strategies are insignificant in the low- and medium-accrual groups, which account for 76.9% of total market capitalization of the full sample. In other words, the momentum profits are derived from firms that accounts for about one quarter of the total market capitalization of the full sample.

Thus far, we have examined raw returns to momentum strategies. A usual check is to adjust returns for risk to ensure that the profitability of momentum strategies among high-accrual firms is not just a compensation for exposures to common sources of risk. Panel B of Table IV presents results from regressing momentum profits for the three accrual groups under alternative asset pricing models: the CAPM, the conditional CAPM, the Fama and French (1993) three-factor model and the Carhart (1997) four-factor model.

In Panel B, we find that the monthly equally-/value-weighted market risk adjusted return (alpha) is 0.31% / 0.50% (t-stat=1.28/1.78), 0.39% / 0.55% (t-stat=1.87/1.79) and 1.38% / 1.33% (t-stat=7.25/5.19) in the low-, medium- and high-accrual groups, respectively. For the conditional CAPM, we directly estimate the conditional alphas and betas using short-window regressions following Lewellen and Nagel (2006). The monthly alpha is 0.45% / 0.49% (t-stat=1.90/1.77), 0.61% / 0.56% (t-stat=3.08/2.28) and 1.55% / 1.34% (t-stat=6.97/5.20) in the low-, medium- and high-accrual groups, respectively. It indicates that time-variation in betas and the equity premium cannot explain accrual-based momentum profit. Under the Fama and French (1993) three-factor model, the three-factor risk adjusted return (alpha) increases with accruals. The monthly alpha is 0.42% / 0.48% (t-stat=1.76/1.40), 0.51% / 0.63% (t-stat=2.41/2.52) and

1.53% / 1.46% (t-stat=7.96/5.60) in the low-, medium- and high-accrual groups, respectively.[11] Furthermore, adding the momentum factor from Carhart's (1997) four-factor model, the monthly risk adjusted return is still significant with monthly return 0.81% / 0.50% (t-stat=5.64/2.42) for high-accrual firms. The significant profit implies the robust effect of accruals and sheds light on the additional contribution of accruals to momentum profitability. The evidence strongly suggests that momentum profitability in high-accrual firms does not represent a compensation for systematic risk based on the market factor, the time-varying beta, the Fama-French three risk factors or the Carhart four risk factors.

A closer examination of Panel B shows that the risk-adjusted returns of loser stocks with high accruals are far lower than those of loser stocks with low and medium accruals, while the risk-adjusted returns of winner stocks are comparable among three accrual groups. Indeed, seven out of the eight alpha's for the loser stocks with high accruals are statistically significantly negative, yet none of the alpha's for the loser stocks with low or medium accruals is significantly negative. These results indicate that the discrepancy in the performance of momentum portfolios between the high accrual group and the low and medium accrual groups is mainly caused by the underperformance of loser stocks with high accruals.

One may wonder whether the momentum anomaly disappears or attenuates in the recent years because the activities of practitioners who may have implemented and taken advantage of such strategies can cause the momentum profitability to disappear. To check for robustness of our findings, we implement our accrual-based momentum strategy for three sub-samples in Panel C of Table IV. The first sub-sample is from January 1965 to December 1989, originally studied by Jegadeesh and Titman (1993). The second sub-sample is from January 1990 to December

[11] Note that the alphas (for both the EW and VW portfolios) for the medium-accrual group are positive and statistically significant under both the conditional CAPM and the Fama-French three-factor model, but their magnitudes are much smaller than those for the high-accrual group.

1999, and the third sub-sample is from January 2000 to December 2008. We find that the accrual-based momentum profit continues to be significant in the second and third sub-sample. Furthermore, there is no significant difference in profitability between these three sub-samples. Monthly equally-/value-weighted raw returns in high-accrual group are 1.41% (t-stat=6.47) / 1.38% (t-stat=5.31), 1.47% (t-stat=3.61) / 1.27% (t-stat=3.25), and 1.23% (t-stat=2.83) / 1.11% (t=2.71) in the first, the second and the third sub-samples, respectively. Monthly equally-/value-weighted Fama-French three-factor risk-adjusted returns in high-accrual group are 1.56% (t-stat=6.99) / 1.55% (t-stat=6.63), 1.70% (t-stat=5.10) / 1.57% (t-stat=4.06), and 1.22% (t-stat=2.70) / 1.16% (t-stat=2.34) in the first, the second and the third sub-samples, respectively.

C. Controlling for Alternative Firm Characteristics

Although there is no general consensus in academic research regarding the cause of momentum profits, a number of studies demonstrate the significance of momentum for stocks with certain firm characteristics. For instance, recent work argues that momentum is stronger in stocks that have high information uncertainty (defined as the degree of ambiguity about firm fundamentals). Specifically, Jiang, Lee and Zhang (2005) and Zhang (2006) argue that the price drift is larger in stocks with greater information uncertainty, which is proxied by firm size, firm age, analyst coverage, dispersion in analyst forecasts, return volatility and cash flow volatility. The prior literature also documents that stocks with a low trading volume generate higher future returns than those with a high trading volume. Lee and Swaminathan (2000) find that low-volume stocks outperform high- volume ones after controlling for price momentum and momentum is stronger among high-volume stocks. Avramov, et al. (2007) show that momentum profitability is statistically significant and economically large among low-grade firms, but it is nonexistent among high-grade firms.

An essential question that arises is whether the effect of accruals on momentum profits is subsumed by other firm financial characteristics. To address this question, we conduct the robustness check of momentum profitability across the accrual dimensions based on 3×3 portfolios sorted independently on accruals and other firm financial characteristics, including firm size, trading volume and credit ratings.[12]

<Table V>

Table V presents results for sorting by accruals and firm size (proxied by market capitalization of equity). Following Fama and French (2008), the size breakpoints are defined as the NYSE 20th and 50th percentiles of market cap for NYSE stocks. Momentum returns increase with accruals across size groups. In Panel A, for the micro-cap/small-cap/large-cap firms, momentum raw returns increase monotonically from 0.35%/0.08%/0.57% to 1.43%/1.51%/1.23% per month moving from low-accrual to high-accrual firms. The difference in momentum profits between low- and high-accrual groups is significant (t-stat=4.09/4.67/2.45 for the micro-cap /small-cap/large-cap firms, not included in Panel A) within all size groups. We also observe that for the big-cap stocks, momentum profit is statistically significant at the 5% level for the low- and medium-accrual groups, although the magnitudes are substantially smaller than that for the high-accrual group. Overall, the result that momentum effect is significantly positive in high-accrual group is robust after controlling for firm size, market factor, Fama-French factors and even momentum factor, as can be seen from Panel B.

<Table VI>

Following Lee and Swaminathan (2000), we define trading volume for a given stock as the average monthly turnover within the six-month portfolio formation period. The monthly turnover is calculated as the number of shares traded divided by the number of shares

[12] In this three-way sorting, each portfolio (out of 9 portfolios in the full sample) contains over 200 firms on average across time.

outstanding at the end of the month. In Panel A of Table VI, for the low/medium/high turnover firms, momentum raw returns increase monotonically from 0.04% / 0.18% / 0.17% to 0.83% / 0.90% / 1.71% per month moving from low-accrual to high-accrual firms. The results indicate that even though stocks with high turnover tend to display higher momentum than stocks with low turnover, the high-accrual stocks generate larger momentum profits than low-accrual stocks for each turnover group. Panel B presents the risk adjusted accrual-based momentum profit by applying the CAPM, the Fama-French three-factor model and the Carhart four-factor model. Overall, the result that momentum profit is significantly positive only in high-accrual group is robust after controlling for trading volume.

<Table VII>

In order to separate the effect of accruals from credit rating effect, we consider credit rating as a control variable. Credit ratings are measured by S&P Domestic Long Term Issuer Credit Rating which is available from June 1985 to December 2008. We convert a rating letter to a numeric number (AAA=1, AA+=2, …, D=22) for sorting purpose. Table VII presents results for sorting by accruals and credit ratings. Momentum profits increase with accruals for all rated groups. In Panel A, for the low/medium/high rated firms, the raw momentum returns increase monotonically from 0.06% / 0.04% / 0.02% to 1.77% / 1.24% / 0.39% per month moving from low-accrual to high-accrual firms. There is also a clear impact of credit rating on momentum return among the low/medium/high-accrual firms, largely consistent with Avramov, et al. (2007). Momentum profit is higher in low rated firms, especially among high-accrual group from 1.77% in low rated firms to 0.39% in high rated firm. The result that momentum effect is significantly positive only in high-accrual group is robust after controlling for the credit ratings factor. The evidence implies that accruals and credit ratings have separate effects on momentum profitability.

One cannot be subsumed by the other.[13]

Panel B of Table VII reports risk-adjusted returns. The results confirm our basic finding in Panel A: risk-adjusted momentum profits are significantly positive only in high-accrual firms. Furthermore, high-accrual firms with medium credit ratings also have significant risk-adjusted returns.

The portfolio sorting methodology in the previous section indicates that the effect of accruals on momentum is not subsumed by several control variables. However, even though we use the full sample of NYSE/AMEX, the number of stocks may not be sufficiently large to evaluate in certain portfolios, through a two or three-way portfolio sorting.[14] To avoid this problem, we estimate the incremental effect of accruals on momentum, considering other characteristics. Specifically, we run the following cross-sectional regression for each sample period:

$$Accurals_{i,t} = \gamma_0 + \gamma_1 MV_{i,t} + \gamma_2 BM_{i,t} + \gamma_3 Turnover_{i,t} + \gamma_4 Credit_{i,t} + \varepsilon_{i,t} \qquad (3)$$

We orthogonalize accruals with respect to other stock characteristics and sort firms on past returns and "residual accruals" (i.e., $\varepsilon_{i,t}$). We document that the orthogonal test supports our previous finding that accruals have the significant and distinct effect on price momentum.

The time matching follows our previous procedures. *Accruals* are previous fiscal year measures, obtained from equation (1). *MV* is the log market value of equity and *BM* is book-to-market equity based on accounting data from the fiscal year ending in calendar year t.

[13] While firms with medium credit ratings and high accruals also have significant momentum returns of 1.24% per month (t-stat=3.25), this finding is unobserved in Avramov, et al. (2007). They document that momentum profitability is large and significant only among low-grade firms. Our result indicates that accruals may have a stronger effect on momentum profitability than credit ratings.

[14] There are several ways to run the cross-sectional regression to estimate the incremental effect of accruals on momentum. For example, 1) Orthogonalize accruals with other stock characteristics and sort firms on past returns and residual accruals; 2) estimate multivariate regressions of future returns on past returns including interactions between past returns and stock characteristics(Fama-MacBeth regression). In this study, we use the first way to run the cross-sectional regression.

Turnover is the lagged six-month turnovers used in our earlier portfolio sorting process, measured from month t-1 to t-6. *Credit* is measured by S&P Domestic Long Term Issuer Credit Rating. We winsorize all variables except *Credit* and *MV* at the 1st and 99th percentile of their cross-sectional distributions to reduce the effects of outliers.

<Table VIII>

We examine the average correlations between the explanatory variables along the cross-section to avoid the potential multicollinearity problem. Panel A of Table VIII reports Pearson and Spearman correlations among the relevant firm-specific characteristics. All the correlations are statistically significant at the 1% level. The largest Pearson/Spearman correlation is found between *MV* and *Credit* (average -0.525/-0.508). The correlations between accruals and other firm financial characteristics are significant, but low in magnitude, confirming that accruals do not capture too much overlapped information as other previously documented characteristics. This provides another cross validation that the effect of accruals on momentum profits is not subsumed by other firm financial characteristics.

Panel B reports incremental effect of accruals on momentum, considering other characteristics. For each month t, all qualified stocks with return for months t−6 through t-1 (formation period) are equally divided into three groups based on residual accruals ($\varepsilon_{i,t}$) from equation 3. For each group, we compute the return of the loser portfolio P1 as the equally-weighted average return over the holding period of the worst-performing 10% and the winner portfolio P10 of the best-performing 10% of the stocks based on their returns over the formation period. There is a one month lag between the formation and the holding periods. The momentum strategy involves buying the winner portfolio and selling the loser portfolio and holding the position for six months. Since the momentum strategy is implemented each month,

the monthly returns represent the equally-/value-weighted average return from this month's momentum strategy and all strategies from up to five months ago. Panel B shows the similar pattern to Table IV: momentum profit is mostly concentrated in firms with high residual accruals.

In sum, sorting on accruals provides different payoffs of momentum strategies across three accrual groups, and the same trend holds when sorting on size, trading volume and credit ratings factors. These proxies for size, volume and credit ratings seem to provide different momentum payoffs only in high-accrual stocks. The evidence strongly suggests that accruals have a unique and pervasive effect not captured by previously documented variables.

D. Evidence under Different Market States

The previous subsections study the firm-level accruals as a determinant variable of momentum profits in the cross-section of U.S. stocks. We now turn our attention to the time series of momentum profits and investigate the effect of accruals on momentum profits in different market states.

<Table IX>

Chordia and Shivakumar (2002) report a business-cycle pattern of momentum profits: momentum profits are significantly positive during expansion periods and negative (though insignificant) during recession periods. We show that the effect of accruals on momentum profits exists during both expansion and recession periods. Panel A of Table IX concentrates on momentum profits during different business cycle periods.[15] We find that momentum profits are significantly positive in high-accrual group during both expansion and recession periods. Indeed, the magnitude is somewhat larger during the recession periods, although t-statistics are lower.

[15] We divide the full sample into expansion and recession months based on NBER's classifications, available on its website.

Monthly raw return and the Fama-French three-factor risk-adjusted return in high-accrual group are 1.49% (t-stat=2.98) / 1.46% (t-stat=6.64) and 1.84% (t-stat=3.71) / 1.59% (t-stat=7.22) during recession/expansion periods, respectively. Interestingly, we find that momentum returns for firms with medium accruals are also significant in the expansion state, although its magnitude is far smaller.

Cooper, Gutierrez, and Hameed (2004) report that momentum profits are significant when the lagged one- to three-year stock market returns are positive and insignificant when lagged stock market returns are negative. Panel B of Table IX provides the momentum profits for the accrual groups in up- and down-markets. We use 12-month cumulative returns on the CRSP value-weighted market index as a proxy for market returns. If the 12-month lagged return on the index is positive (negative), we define a holding-period month as an UP (DOWN) month. We show that the effect of accruals on momentum profits exists during both up-and down-markets. Monthly raw return and risk adjusted return in high-accrual group are 1.37% (t-stat=7.22) / 1.34% (t-stat=6.37) and 1.52% (t-stat=7.93) / 1.50% (t-stat=7.11) during down/up market, respectively. We also notice that momentum return is significant at the 5% level for the medium-accrual group in the up-market state, albeit its magnitude is much smaller.

Antoniou, Doukas, and Subrahmanyam (2011) argue that market-wide investor sentiment should be connected to aggregate momentum profits. Applying different proxies for sentiment, they find that momentum profits are significant and positive when sentiment is optimistic and insignificant when sentiment is pessimistic.[16] Following Antoniou, Doukas, and Subrahmanyam (2011), a formation period is classified as optimistic (pessimistic) if the average sentiment belongs to the top (bottom) 30% of the three-month rolling average sentiment time

[16] We use the monthly sentiment index constructed by Baker and Wurgler (2006, 2007) to classify the sample months into pessimistic and optimistic periods. The sentiment index is available from Jeffrey Wurgler's homepage.

series. We show that the effect of accruals on momentum profits holds in both pessimistic and optimistic market states. In Panel C of Table IX**,** monthly raw momentum return and risk adjusted return in high-accrual group are 1.29% (t-stat=5.98) / 1.40% (t-stat=6.30) and 1.40% (t-stat=6.28) / 1.53% (t-stat=6.74) during periods of pessimistic and optimistic states, respectively. Momentum profits in medium-accrual group are also positively significant during optimistic state.

Overall, the evidence on the significant relation between momentum profitability and accruals is robust to the various checks we have implemented, including adjusting for size, trading volume, credit ratings, and under alternative asset pricing models. The effect of accruals on momentum profits is not subsumed by previously documented cross-sectional characteristics, and it holds in various time-series market states. Given the robustness of our results, the remainder of this paper provides possible explanations for the profitability of momentum in high-accrual stocks.

III. Possible Explanations for the Sources of Momentum Profitability

The preceding section reports that momentum profitability is economically large and statistically significant among high-accrual firms, but is in general insignificant or much weaker among low- and medium-accrual firms. Especially, the discrepancy in payoff of the loser portfolio (P1) among three accrual groups implies that accrual-based momentum profit is largely driven by the downward payoff of loser stocks with high accruals.

In this section, we analyze the predictive power of accruals for stock returns based on two hypotheses —earnings manipulation and earnings overestimation. We focus on firms with high accruals because of the asymmetric effects of high and low accruals. Investors, analysts and the media usually pay more attention to firms' short-term earnings performance. For example,

earnings overestimation possibly occurs to firms with high current earnings associated with high accruals. Even under the view that accruals represent managerial manipulation, given the attention paid by investors and analysts, there are strong incentives and pressures to blow up a firm's earnings prospects (Chan, Karceski, and Lakonishok, 2007). In comparison, there are weaker motives to lower current earnings and defer them.[17] Accordingly, traces of manipulation are more likely to be found when accruals are high than when accruals are low. Kothari, Loutskina, and Nikolaev (2008) also report the information asymmetry between firms with low and high accruals. They indicate that managers of overvalued firms are likely to manage their firms' accruals upwards to prolong the overvaluation.

As managers inflate earnings above cash flows, accruals rise. From the operating sheet and balance sheet, we can rewrite equation (1) as:

$$Accruals = (\Delta\ accounts\ receivable + \Delta\ inventories + \Delta\ other\ current\ assets) - (\Delta\ accounts\ payable + \Delta\ other\ current\ liabilities) - Dep \quad (4)$$

Chan, et al. (2006) indicate that Δ *accounts receivable*, Δ *inventories* and Δ *accounts payable* are three items that contribute the most to differentiating accruals across firms. For instance, high accruals may reflect increases in accounts receivable when managers record sales prematurely, or decreases in current liabilities when managers understate accounts payable. Since investors fixate on reported fundamental accounting income, they are temporarily misled. Teoh, Welch and Wong (1998a, 1998b) and Gong, Louis and Sun (2008) provide evidence supporting the existence of managerial manipulation through accruals.[18] In order to capture managerial manipulation, we decompose the accruals into nondiscretionary accruals and

[17] Under the "big bath" phenomenon, if a company will miss their earnings target anyway, it is more beneficial to recognize all losses at once so that there will only be a one-time market reaction to bad news.

[18] Teoh, Welch, and Wong (1998a. 1998b) show that before an initial public offering (IPO) or a seasoned equity offering (SEO), management will want to inflate earnings to make the offering more attractive to investors. Gong, Louis, and Sun (2008) provide evidence on managers' choices of accounting accruals during stocks repurchase.

discretionary accruals. Since discretionary accruals cannot be observed directly from financial statements, we estimate them following Jones (1991):[19]

$$TA_{it} / A_{it-1} = a(1/A_{it-1}) + b(\Delta REV_{it} / A_{it-1}) + c(PPE_{it} / A_{it-1}) + \varepsilon_{it} \quad (5)$$

where:

TA_{it} = total accruals in year t for firm i; (calculated from equation (1))

ΔREV_{it} = change in revenues in year t for firm i; (Compustat item 12)

PPE_{it} = gross property, plant, and equipment in year t for firm i; (Compustat item 7).

A_{it-1} = total assets in year t -1 for firm i;

ε_{it} = error term in year t for firm i;

We estimate equation (5) in the cross-section for each two-digit SIC code and year combination. We denote the predicted values of the Jones model as nondiscretionary accruals and the residuals as discretionary accruals. The nondiscretionary component captures the impact of business conditions while the discretionary portion reflects managerial choices. The earnings manipulation hypothesis suggests that the discretionary component of accruals should have most predictive power for future returns, and thus serves as a better and more accurate measure of earnings manipulation (see, e.g., Kasznik, 1999; Xie, 2001; and Kothari, Leone and Wasley, 2004).

We propose another hypothesis that the effect of accruals may arise from the similar ways of investor behavior as other widely-documented explanations in stock returns, such as price and earnings momentum (see, e.g., Hirshleifer, 2001; and Barberis and Thaler, 2002). We

[19] The decomposition method we use in this study is based on Jones (1991), which is different from Chan, et al. (2006). The nondiscretionary component captures the impact of business conditions while the discretionary portion reflects managerial choices. Dechow, Sloan, and Sweeney (1995) suggest the Jones' model as the most appropriate procedure to capture the effect of earnings management after they evaluate different decomposition procedures.

use broad categories of business activities—current operating activities, noncurrent operating activities and financing activities. We refer to the corresponding accruals categories as the change in non-cash working capital (ΔWC) and depreciation, respectively:

$$Accruals = (\Delta\ accounts\ receivable + \Delta\ inventories - \Delta\ accounts\ payable) + (\Delta\ other\ current\ assets - \Delta\ other\ current\ liabilities) - Dep = \Delta WC - Dep \quad (6)$$

From equation (6), accruals are mainly driven by changes in working capital, which in turn tend to rise with sales. Analysts and investors tend to rely too heavily on past growth in their forecasts and valuations (see, e.g., De Bondt and Thaler, 1990; La Porta, et al., 1997; and Chan, Karceski and Lakonishok, 2003). If investors extrapolate the past fast growing trend of high accrual firms into the future, they may overestimate the persistence in sales growth. Richardson, et al. (2005) report that less reliable categories of accruals have lower earnings persistence and investors do not fully anticipate the lower earnings persistence. Consequently, if the market pricing of high-accrual firms is built on an overoptimistic estimate of future growth rates, future returns are more likely to be disappointing.

A. Operating Performance of the Winner and Loser Stocks

To understand the persistence of winners and losers across the three accrual groups, we analyze the sales growth reflecting operating performance. The ratio is an industry-adjusted and time-series average of the cross-sectional median values. The industry adjustment involves subtracting the industry median from each firm's accounting ratio. We focus on the winner (P10) and loser (P1) portfolios for each of the three accrual groups. The results are presented in Table X starting from the portfolio sorting periods and going through the holding periods from month t−6 through month t+12. Our goal is to relate the return persistence of winner and loser stocks with high accruals to their underlying operating performance.

<Table X>

We examine the operating performance of the winner and loser stocks that are sorted across low-, medium- and high-accrual groups. Table X shows substantial differences in operating performance between winners and losers, and among low-, medium- and high-accrual stocks. Focusing on the high-accrual group, the industry-adjusted sales growth of loser stocks maintain the relative high sales growth rate over the formation period from an average of 6.61% in month t−6 to 8.22% in month t = 0. The sales growth starts deteriorating over the holding period, reaching a low of 3.08% in month t+6 and 0.00% in month t+12. Such deterioration in sales growth is observed over the holding period for the low- and medium-accrual losers as well; however, the magnitude of deterioration is relatively small in those cases.

Sales growth for the winner stocks with high accruals is large and positive over the formation period and the holding period. The sales growth increases from 3.88% in month t= −6 to 6.63% in month t=0 and the sales growth continues to improve over the holding period, reaching a high of 7.39% in month t+6. As for the low- and medium-accrual winners, the sales growth also improves over the holding period. In sum, the industry-adjusted sales growth of high-accrual losers have decreased dramatically over the holding period, while the high-accrual winners have positive industry-adjusted sales growth that improves and remains high over the twelve months of the holding period.

Table X shows that the winner and loser stocks in high-accrual group display the opposite industry-adjusted sales growth behavior for the holding period. This operating performance check explains the different holding returns across three accrual groups. While loser stocks of all three accrual groups experience sales growth deterioration, losers with high accruals experience more serious sales growth deterioration than those with low and medium accruals.

Considering their corresponding sales growth level over the formation period, investors are most likely to overestimate the sales growth of the loser stocks with high accruals. In particular, these firms have enjoyed high sales growth in the past and investors extrapolate past growth to form exaggerated expectations about future growth. Over the holding period, the release of sales growth deterioration information will indicate a bad signal to the market and have a negative effect on stock price.

This explanation is consistent with the discrepancy in payoff of loser stocks and non-discrepancy in payoff of winner stocks across three accrual groups (returns of P1 and P10 in Table IV). The evidence supports the hypothesis: the market pricing of firms with high accruals may be built on earnings overestimation. In addition, we cannot rule out the existence of managers that manipulate earnings through accruals, because this misvaluation may be induced by managerial efforts to manipulate earnings and stock prices.[20] One possible explanation for high-level sales growth of loser stocks with high accruals during the formation period is that such high-level sales growth does not reflect the real performance of these firms. The loser firms with high accruals may just mimic the performance of winner firms with high accruals and disguise the fact. However, the market may gradually (or immediately) realize this point. That is why the returns of loser firms with high accruals could not match their operating performance during the formation period, so these loser firms with high accruals still fall into the lowest past returns.[21] The time series behavior of accruals and operating performance for firms with high accruals gives strong evidence that managers have strong incentives to manipulate earnings

[20] For instance, when sales growth starts to slow down, managers may face increasing pressures to inflate earnings in order to meet analyst forecasts, thus leading to an increase in accruals. These pressures may be much stronger if investors and analysts also maintain overstated expectations about future profitability growth. At the same time, inventory may start to accumulate as sales growth declines, and accounts receivable may increase as competitive pressures force firms to extend better credit terms, so accruals increase (Thomas and Zhang, 2002).

[21] Dechow, Sloan, and Sweeney (1996) find that after investors discover accounting manipulations, these firms experience significant increases in their cost of capital. Similarly, Karpoff, Lee, and Martin (2008) document that firms on average lose 41 percent of their market value when financial misrepresentations are publicly disclosed.

through accruals. This temporary sales growth inflation may mislead investors. It implies that accrual-based momentum profit is affected by both earnings manipulation and earnings overestimation.

B. The Behavior of Special Items

Another popular interpretation of high accruals could be that high accruals reflect managers' deliberate attempts to manipulate accounting numbers in order to avoid disappointing analysts and investors. While this results in higher earnings, the cash flow situation does not improve because accruals are raised due to the increase in inventory. Inflating earnings in one period has consequences for reported earnings in the future. In the case of overstating inventory, one potential impact is an increase in writedowns of inventory in subsequent years. Such writedowns will show up at least in part as a reversal of future accruals: after the original overstatement of inventory which increases accruals, accruals become lower in future years. Part of the previous high accruals may also be reported as a special item on the income statement. Many studies report evidence supporting the existence of managerial manipulation of earnings (see, e.g., Subramanyam, 1996; Teoh, Welch, and Wong, 1998a, 1998b; and Kothari, Loutskina, and Nikolaev, 2008). We extract special items from Compustat annual data (item 17), which reflect unusual charges to a firm's income, and include writedowns of inventory or receivables, as well as restructuring or reorganization costs. We check the behavior of accruals and special items in the years following portfolio formation in order to track the traces of earnings manipulation in the previous years, especially in high-accrual group.

<Table XI>

Table XI reports the level of special items as a percentage of average total assets for firms sorted by accruals. We track special items over each of the six months up to the portfolio

formation date and the subsequent year. The level of special items is usually negative because analysts and investors generally focus on earnings from continuing operations. When earnings are below expectation, managers may conceal or remedy such information and try to put the best face on the situation. They may interpret the earnings disappointment as a one-time event, and count it as a special item in order to shield net income from continuing operations. What is especially striking is the difference in how special items behave over the years before and after portfolio formation.

For the loser stocks with high accruals, special items experience the largest decline over the 12 months following portfolio formation, comparing with the prior years. Their special items are on average -3.59 basis points (bp) of total assets before portfolio formation, and jump to -9.8bp on average in the post-formation period. The corresponding average special items for the loser stocks in the low- and medium- accrual groups change from -14.93bp and -6.18bp (pre-formation) to -13.06bp and -9.24bp (post-formation). The largest amount of decline from the loser stocks with high accruals in income-decreasing special items in the subsequent year may reflect the effects of managerial manipulation of earnings in prior years. Such effect of earnings manipulation is reversed over time or is eliminated in terms of special items in the subsequent years. The evidence shows that the loser stocks in high-accrual group may experience the most serious earnings manipulation. At the same time, the market may gradually realize this point implying the low payoff of loser stocks with high accruals during the holding period. While earnings manipulation may also exist in the portfolios including winner and loser stocks in low- and medium-accrual groups, their effect could be offset from each other. Since earnings manipulation effect could not be offset in high-accrual group, this causes the discrepancy in payoff of momentum profits across three accrual groups.

C. The Role of Nondiscretionary and Discretionary Accruals

To differentiate the earnings overestimation and earnings manipulation, we decompose accruals into nondiscretionary and discretionary components and examine the information in each component for returns. The nondiscretionary component captures the impact of business conditions while the discretionary portion reflects managerial choices. The overestimation hypothesis posits that firms with high accruals represent instances of overvaluation because of investors' extrapolated biases. In particular, these firms have enjoyed high sales growth in the past and investors extrapolate past growth to form exaggerated expectations about future growth. The manipulation hypothesis suggests that the discretionary component of accruals that is unrelated to sales growth should predict future returns.

<Table XII>

Stocks are sorted into three groups by nondiscretionary accruals in Panel A, and by discretionary accruals in Panel B of Table XII. In Panel A, the magnitude of momentum profits does not change much across three groups. We observe a 0.42% monthly return for low, 0.39% for medium and 0.51% for high nondiscretionary accrual group, respectively. The decomposition procedure assumes that nondiscretionary accruals grow proportionally with sales. However, Panel A indicates that there is no significant discrepancy in momentum payoff across nondiscretionary accrual groups and future returns. Accordingly, this evidence is not consistent with the earnings overestimation hypothesis.

In terms of the monthly return profits between the loser and winner portfolios, the sort by discretionary accruals comes close to matching the performance of the sort by total accruals. In Panel B, the average monthly profit for high discretionary accrual group over the following six months is 1.00% which is significant at the 1% level (t-stat=5.02). The monthly profit

corresponding to the classification by total accruals is 1.37% (see Table IV). The average monthly profits for low and medium discretionary accrual groups are significantly lower than for the high discretionary accrual group (0.39% for low and 0.49% for medium group).

Panel C shows the percentage of discretionary accruals divided by total accruals across three accrual groups. This percentage could be considered as a proxy of earnings management since discretionary accruals capture the effect of managerial discretion. We find that the loser stocks have a higher percentage of discretionary accruals than winner stocks in the high accrual group, implying that loser stocks with high accruals suffer more earnings management. Instead, we do not find much difference in earnings management between loser and winner stocks among low and medium accrual groups. Panels B and C are consistent with the earnings manipulation hypothesis.[22]

In summary, most momentum profitability is attributable to the high discretionary accrual group. In each nondiscretionary accrual group, the magnitude of momentum profitability is almost at the same level as that from total accruals. Since discretionary accruals are more likely to capture accruals arising from managerial discretion, the above findings indicate that the market overprices the portion of discretionary accruals stemming from earnings management. In particular, the effect is largely driven by the poor performance of the loser stocks with high accruals, where the incentive to manipulate earnings may be the strongest among the three accrual groups.

[22] As pointed out in Xie (2001), discretionary accruals are negatively related to future stock returns. But why do winners in the high discretionary accruals group continue to earn high returns? One possible explanation is due to the different portfolio holding periods. Xie (2001) holds his portfolios for at least 12 months after portfolio formation, while we hold the portfolios for only 6 months after formation. If we hold the portfolios for 12 months after the portfolio formation in Panel B of Table XII, the momentum profits will be much less significant because of the large drop in payoff of winner stocks with high discretionary accruals. It implies the less persistent effect of discretionary accruals on stock returns.

IV. Conclusion

Price momentum is an anomaly not explained by the Fama and French (1996) three-factor model and other risk based models. To answer the three empirical questions raised at the beginning of this paper, we employ data on 5,195 NYSE and AMEX firms with sufficient accounting information over the January 1965-December 2008 period. Our analysis indicates that momentum profitability is statistically significant and economically large among high-accrual firms, but it is nonexistent or much weaker among low- and medium-accrual firms. The results are robust and cannot be explained by the market factor, the time-varying beta, the Fama-French three factors, trading volume, credit ratings, and even the momentum factor. The effect of accruals on momentum also holds in the recent sub-sample.

We propose two hypotheses - earnings overestimation and earnings manipulation and analyze the predictive power of accruals for stock returns based on three tests. Over the portfolio holding period, the industry-adjusted sales growth of loser stocks with high accruals deteriorates significantly while that of the winner stocks with high accruals improves. We track special items to check for the existence of earnings manipulation. Over the portfolio formation period and the holding period, the largest amount of income-decreasing special items for the loser firms with high accruals indicates that the effect of earnings manipulation in prior years is eventually reversed. We find no significant discrepancy in momentum profit across nondiscretionary component of accruals which provides weak support for the earnings overestimation hypothesis. The discretionary accruals contribute the most to the discrepancy in momentum profits, supporting the earnings manipulation hypothesis. Our findings indicate that accrual-based momentum profit is largely driven by downward payoff of loser stocks with high accruals, jointly affected by both earnings manipulation and earnings overestimation.

Our paper also highlights the predictive power of accruals for equity valuation. Conceivably, accruals may deserve much more attention from investors and analysts in future research. As suggested by Campbell, Polk and Vuolteenaho (2010), accounting variables are not sufficiently emphasized in contemporary academic research.[23] The robust effect of accruals on momentum documented in this paper sheds light on the contribution of accruals to momentum profitability.

[23] This paper is not to assess the costs and benefits of accrual basis accounting. Actually, accrual basis accounting has gained universal acceptance recently. For instance, worldwide, public sectors have started adopting accrual accounting instead of traditional cash-basis accounting. Bradshaw, Richardson, and Sloan (2001) show that analysts do not incorporate into their forecasts the earnings reversal that is associated with high accruals. They also find that although firms with high accruals exhibit higher incidence of SEC enforcement actions, their auditors are not more likely to issue qualified opinions.

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Table I Summary Statistics of Monthly Raw Return and Price Momentum Profit

Panel A presents descriptive statistics of monthly returns for all stocks listed on CRSP after merging with Compustat. We exclude stocks where at time t the price is below $5 and the market capitalization is in the lowest NYSE size decile. Returns are computed as the time-series mean of the cross-sectional average return for each month (in percent per month). Standard deviation, skewness, and kurtosis are computed for each stock and then averaged across all stocks. Size is computed as the time-series mean (median) of the cross-sectional mean of all market capitalizations in each month (in $millions).

In Panel B, for each month t, all NYSE and AMEX stocks on the monthly CRSP tape with returns for month t−6 through t-1 are ranked into decile portfolios according to their cumulative returns during that period. Decile portfolios are formed monthly and their returns are computed by weighting equally all firms in that decile ranking. The momentum strategy involves buying the winner portfolio P10 and selling the loser portfolio P1. The positions are held for the following six-months (t+1 through t+6). There is a one month lag between the formation and the holding periods. Monthly returns represent the equally-weighted average return from this month's momentum strategy and all strategies from up to five months ago. The table shows the monthly average raw return during the holding period of the winner P10, the loser P1, and the momentum portfolio. T-statistics are in parentheses. '*' and '**' indicate that the profits of trading strategies are statistically significant at the 5% and 1% levels, respectively. The sample period is January 1965 to December 2008.

Panel A: Return and Size Characteristics of Sample Firms

No. of firms	5,195
Mean return (%)	1.18
Median return (%)	0.77
Standard deviation of return (%)	10.65
Skewness of return	0.63
Kurtosis of return	6.38
Mean size ($millions)	3,319.08
Median size ($millions)	552.49

Panel B: Price Momentum Profit (in percent per month)

Portfolio		Return	t-stat
Overall	P10-P1	1.03**	(5.90)
	P1	0.59	(2.09)
	P10	1.62	(5.76)
January	P10-P1	-1.29	(-1.68)
	P1	4.55	(3.81)
	P10	3.26	(3.27)
Non-January	P10-P1	1.23**	(7.11)
	P1	0.24	(0.83)
	P10	1.47	(5.03)

Table II Components in Accounting Earnings and Accrual Anomaly

Panel A presents the mean value of the accrual, earnings and cash flow component. Ten portfolios of firms are formed annually by assigning firms to deciles based on the value of accruals. Following Sloan (1996), accruals are defined as the change in non-cash current assets, less the change in current liabilities (exclusive of short-term debt and taxes payable) and depreciation expense, all divided by average total assets. Earnings are defined as operating income after depreciation divided by average total assets. Cash flows are defined as the difference between earnings and accruals.

In Panel B, for each month t, qualified stocks are ranked into decile portfolios according to their fiscal year accruals (A1 for the lowest accrual group and A10 for the highest). Decile portfolios are formed monthly and their returns are computed by weighting equally all firms in that decile ranking. The strategy involves buying the lowest accrual portfolio A1 and selling the highest accrual portfolio A10. The positions are held for the following six-months (t+1 through t+6). There is a one month lag between the formation and the holding periods. Monthly returns represent the equally-weighted average return from this month's strategy and all strategies from up to five months ago. The table shows the monthly average raw return during the holding period of the lowest accruals A1, the highest accruals A10 and accruals strategy portfolios. T-statistics are in parentheses. '*' and '**' indicate that the profits of trading strategies are statistically significant at the 5% and 1% levels, respectively. The sample period is January 1965 to December 2008.

Panel A: Mean Value of Accruals, Earnings and Cash Flow Components

	Sorted by accruals									
	Lowest	2	3	4	5	6	7	8	9	Highest
Accruals	-0.14	-0.08	-0.06	-0.05	-0.03	-0.02	-0.01	0.00	0.03	0.11
Earnings	0.08	0.10	0.11	0.10	0.10	0.11	0.11	0.12	0.13	0.13
Cash flows	0.22	0.18	0.17	0.15	0.13	0.13	0.12	0.12	0.10	0.02

Panel B: Accrual Anomaly

	Return (in percent per month)
A1-A10 (accruals profit)	0.49 **
	(4.06)
A1 (lowest)	1.46
	(5.45)
A10 (highest)	0.97
	(3.23)

Table III: Combined Momentum and Accruals Effects (Independent Two-way Sorting)

For each month t, all NYSE and AMEX stocks on the monthly CRSP tape with returns for month t−6 through t-1 are ranked into decile portfolios according to their cumulative returns (P1 for the loser portfolio, P10 for the winner portfolio) and ranked into decile portfolios according to their fiscal year accruals (A1 for the lowest and A10 for the highest accruals) simultaneously. Four extreme portfolios are shown in the table below. (A1, P1) stands for the portfolio of loser stocks with the lowest accruals. (A10, P1) stands for the portfolio of loser stocks with the highest accruals. (A1, P10) stands for the portfolio of winner stocks with the lowest accruals. (A10, P10) stands for the portfolio of winner stocks with the highest accruals. We exclude stocks which at the end of month t are priced below $5 or are smaller than the smallest NYSE size decile. Decile portfolios are formed monthly and their returns are computed by weighting equally all firms in that decile ranking. The positions are held for the following six-months (t+1 through t+6). There is a one month lag between the formation and the holding periods. Monthly raw returns represent the equally-weighted average return from this month's combined strategy and all strategies from up to five months ago. T-statistics are in parentheses. '*' and '**' indicate that the profits of trading strategies are statistically significant at the 5% and 1% levels, respectively. The sample period is January 1965 to December 2008.

Portfolio	(A1, P1)	(A10, P1)
Raw return	1.39	-0.02
(in percent per month)	(4.08)	(-0.07)
Portfolio	(A1, P10)	(A10, P10)
Raw return	1.66	1.57
(in percent per month)	(4.99)	(4.50)
Strategy 1	Diff_1 = (A10, P10) - (A10, P1)	
Raw return	1.59**	
(in percent per month)	(6.80)	
Strategy 2	Diff_2 = (A1, P10) - (A1, P1)	
Raw return	0.27	
(in percent per month)	(0.93)	
Strategy 3	Diff_3 = (A1, P10) - (A10, P1)	
Raw return	1.68**	
(in percent per month)	(6.59)	

Table IV Momentum Profits across Accruals

For each month t, all qualified stocks with return for months t−6 through t-1 (formation period) are equally divided into three groups based on accruals. We exclude stocks which at the end of month t are priced below $5 or are smaller than the smallest NYSE size decile. For each accrual group, we compute the return of the loser portfolio P1 as the equally-weighted average return over the holding period of the worst-performing 10% and the winner portfolio P10 of the best-performing 10% of the stocks based on their returns over the formation period. There is a one month lag between the formation and the holding periods. The momentum strategy involves buying the winner portfolio and selling the loser portfolio and holding the position for six months. Since the momentum strategy is implemented each month, the monthly returns represent the equally-/value-weighted average return from this month's momentum strategy and all strategies from up to five months ago. The table shows, for accrual group, the average returns of the momentum strategy, as well as the average return of the loser and winner portfolios.

Panel A shows monthly raw equally-/value-weighted return of momentum profits sorted by three accruals. Panel B shows the risk adjusted equally-/value-weighted return (alpha) applying alternative asset pricing model (CAPM, Conditional CAPM, FF three-factor model and Carhart four-factor model). Panel C shows raw and risk-adjusted (applying the FF three-factor model) momentum returns by three accruals groups in three sub-samples. T-statistics are in parentheses. '*' and '**' indicate that the profits of trading strategies are statistically significant at the 5% and 1% levels, respectively. The whole sample period is January 1965 to December 2008.

Panel A: Momentum Profits (Raw Return) by Accrual Groups

	Low Accruals (A1)				Medium Accruals (A2)				High Accruals (A3)			
	EW-return	t-stat	VW-return	t-stat	EW-return	t-stat	VW-return	t-stat	EW-return	t-stat	VW-return	t-stat
P10-P1 (in percent)	0.26	(1.12)	0.45	(1.61)	0.36	(1.76)	0.54	(1.71)	**1.37****	**(7.26)**	**1.29****	**(5.06)**
P1	1.29	(4.04)	0.83	(2.58)	1.11	(3.77)	0.72	(2.48)	0.13	(0.42)	-0.03	(-0.11)
P2	1.22	(4.08)	0.96	(3.70)	1.14	(4.77)	0.85	(3.65)	0.64	(2.36)	0.33	(1.21)
P3	1.25	(5.01)	0.92	(4.04)	1.04	(4.70)	0.87	(4.13)	0.93	(3.90)	0.73	(2.87)
P4	1.26	(5.48)	0.99	(4.62)	1.15	(5.62)	0.96	(4.81)	0.98	(3.92)	0.71	(2.93)
P5	1.23	(5.54)	0.92	(4.63)	1.18	(5.67)	0.92	(4.73)	1.04	(4.18)	0.76	(3.24)
P6	1.21	(5.41)	0.92	(4.69)	1.11	(5.50)	0.94	(4.88)	1.03	(4.23)	0.77	(3.33)
P7	1.25	(5.53)	1.01	(4.99)	1.18	(5.81)	0.95	(4.86)	1.11	(4.57)	0.80	(3.35)
P8	1.28	(5.44)	0.96	(4.41)	1.09	(5.05)	0.90	(4.39)	1.05	(4.37)	0.81	(3.47)
P9	1.53	(6.01)	1.23	(5.12)	1.23	(5.41)	1.14	(5.29)	1.24	(4.81)	0.94	(3.90)
P10	1.55	(5.40)	1.27	(4.57)	1.47	(5.65)	1.26	(4.95)	1.50	(5.08)	1.26	(4.32)
Percent of market cap	41.5%				35.4%				23.1%			

Panel B: Risk Adjusted (Equally-/Value-weighted) Return of Momentum Profits by Accrual Groups

	Low Accruals (A1)				Medium Accruals (A2)				High Accruals (A3)			
	EW-return	t-stat	VW-return	t-stat	EW-return	t-stat	VW-return	t-stat	EW-return	t-stat	VW-return	t-stat
Adjusted by CAPM												
P1	0.34	(1.82)	0.03	(0.18)	0.20	(1.25)	-0.07	(-0.38)	-0.78	(-4.45)	-0.87	(-3.76)
P10	0.65	(3.21)	0.53	(2.03)	0.59	(2.49)	0.48	(1.71)	0.60	(3.81)	0.46	(1.70)
P10-P1(in percent)	0.31	(1.28)	0.50	(1.78)	0.39	(1.87)	0.55	(1.79)	**1.38****	**(7.25)**	**1.33****	**(5.19)**
Adjusted by conditional CAPM												
P1	0.33	(1.67)	0.15	(0.89)	0.18	(1.03)	-0.06	(-0.56)	-0.81	(-4.43)	-0.75	(-3.21)
P10	0.78	(3.06)	0.64	(2.55)	0.79	(3.96)	0.50	(2.23)	0.74	(3.93)	0.59	(2.70)
P10-P1	0.45	(1.90)	0.49	(1.77)	**0.61****	**(3.08)**	**0.56***	**(2.28)**	**1.55****	**(6.97)**	**1.34****	**(5.20)**
Adjusted by the Fama-French three-factor model												
P1	0.06	(0.41)	-0.05	(-0.22)	-0.10	(-0.51)	-0.41	(-1.67)	-1.03	(-4.85)	-1.10	(-4.36)
P10	0.48	(2.13)	0.43	(1.61)	0.41	(1.84)	0.22	(0.96)	0.50	(2.62)	0.36	(1.51)
P10-P1	0.42	(1.76)	0.48	(1.40)	**0.51***	**(2.41)**	**0.63***	**(2.52)**	**1.53****	**(7.96)**	**1.46****	**(5.60)**
Adjusted by the Carhart four-factor model												
P1	0.58	(2.73)	0.31	(1.04)	0.42	(2.50)	0.38	(1.65)	-0.59	(-2.25)	-0.44	(-1.79)
P10	0.11	(0.85)	0.00	(0.01)	0.10	(1.09)	0.03	(0.14)	0.22	(1.62)	0.06	(0.45)
P10-P1	**-0.47****	**(-2.62)**	-0.31	(-1.42)	**-0.32***	**(-2.18)**	-0.35	(-1.94)	**0.81****	**(5.64)**	**0.50***	**(2.42)**

Panel C: Momentum Profits by Accrual Groups in Sub-Samples

	01/1965 - 12/1989			01/1990-12/1999			01/2000-12/2008		
	Equally-weighted average return								
	Low (A1)	Medium (A2)	High (A3)	Low (A1)	Medium (A2)	High (A3)	Low (A1)	Medium (A2)	High (A3)
P1 (in percent)	1.21	1.12	0.25	1.47	1.13	0.10	1.23	1.02	-0.02
	(3.84)	(3.86)	(0.75)	(3.22)	(2.93)	(0.19)	(2.62)	(1.93)	(-0.25)
P10	1.65	1.57	1.66	1.53	1.47	1.57	1.41	1.33	1.21
	(5.42)	(5.26)	(5.77)	(4.04)	(4.33)	(4.06)	(3.14)	(2.68)	(2.64)
P10-P1 (raw return)	0.44	0.45	**1.41****	0.06	0.34	**1.47****	0.18	0.31	**1.23****
	(1.34)	(1.56)	**(6.47)**	(0.15)	(0.79)	**(3.61)**	(0.43)	(0.92)	**(2.83)**
Risk adjusted return	0.52	**0.59***	**1.56****	0.19	0.43	**1.70****	0.47	0.49	**1.22****
	(1.68)	**(1.98)**	**(6.99)**	(0.64)	(1.18)	**(5.10)**	(1.14)	(0.96)	**(2.70)**
	Value-weighted average return								
	Low (A1)	Medium (A2)	High (A3)	Low (A1)	Medium (A2)	High (A3)	Low (A1)	Medium (A2)	High (A3)
P1 (in percent)	0.82	0.84	0.09	0.98	0.57	-0.01	0.70	0.47	-0.21
	(1.93)	(2.24)	(0.34)	(2.86)	(1.83)	(-0.13)	(1.52)	(0.85)	(-0.80)
P10	1.39	1.40	1.47	1.24	1.10	1.26	1.14	0.96	0.90
	(4.75)	(4.50)	(4.06)	(3.35)	(3.41)	(3.76)	(2.68)	(1.89)	(1.98)
P10-P1 (raw return)	0.57	0.56	**1.38****	0.26	0.53	**1.27****	0.44	0.49	**1.11****
	(1.64)	(1.90)	**(5.31)**	(0.92)	(1.91)	**(3.25)**	(0.96)	(0.95)	**(2.71)**
Risk adjusted return	0.55	0.66*	**1.55****	0.39	**0.63***	**1.57****	0.52	0.57	**1.16***
	(1.93)	(2.13)	**(6.63)**	(1.05)	**(2.18)**	**(4.06)**	(1.14)	(1.11)	**(2.34)**

Table V Independent Sorts by Accruals and Size

For each month t, all stocks with available return data for months t−6 through t-1 (formation period) are divided into 9 groups based on their size equally and accruals equally. The table shows, for each group, the average returns of the momentum strategy, which involves buying the winner portfolio P10 of the best-performing 10% of the stocks based on their returns over the formation period and selling the loser portfolio P1 and holding the position for six months (t +1 through t+6). The size breakpoints are defined as the NYSE 20th and 50th percentiles of market cap for NYSE stocks.

Panel A shows monthly raw return of momentum profits of 9 groups. Panel B apply alternative asset pricing model (CAPM, FF three-factor model and Carhart four-factor model) to check the significance of abnormal return (alpha). T-statistics are in parentheses. '*' and '**' indicate that the profits of trading strategies are statistically significant at the 5% and 1% levels, respectively. The sample period is January 1965 to December 2008.

Panel A: Independent Sort by Accruals and Size (Raw Return)

	Low accruals	Medium accruals	High accruals
Micro-cap	0.35	0.38	1.43**
	(0.92)	(0.99)	(5.28)
Small-cap	0.08	0.30	1.51**
	(0.26)	(1.11)	(6.00)
Big-cap	0.57*	0.50*	1.23**
	(2.23)	(1.99)	(4.98)

Panel B: Independent Sort by Accruals and Size (Risk Adjusted Return)

	Low accruals	Medium accruals	High accruals
		Micro-cap	
CAPM	0.42	0.41	1.43**
	(1.08)	(1.08)	(5.27)
FF three-factor	0.56	0.65	1.49**
	(1.42)	(1.68)	(5.41)
Carhart four-factor	-0.14	0.04	1.02**
	(-0.36)	(0.10)	(3.77)
		Small-cap	
CAPM	0.15	0.34	1.49**
	(0.45)	(1.27)	(5.88)
FF three-factor	0.12	0.54	1.66**
	(0.35)	(1.94)	(6.48)
Carhart four-factor	-0.73*	-0.20	1.03**
	(-2.43)	(-0.96)	(4.38)
		Big-cap	
CAPM	0.61*	0.52*	1.24**
	(2.38)	(2.06)	(5.02)
FF three-factor	0.78**	0.57*	1.39**
	(2.99)	(2.24)	(5.54)
Carhart four-factor	-0.14	-0.29	0.51*
	(-0.72)	(-1.38)	(2.57)

Table VI Independent Sorts by Accruals and Volume

For each month t, all stocks with available return data for months t−6 through t-1 (formation period) are divided into 9 groups based on volume equally and accruals equally. The table shows, for each group, the average returns of the momentum strategy, which involves buying the winner portfolio P10 of the best-performing 10% of the stocks based on their returns over the formation period and selling the loser portfolio P1 and holding the position for six months (t +1 through t+6). Volume is measured by average past six monthly turnovers. Panel A shows monthly raw return of momentum profits of 9 groups. Panel B apply alternative asset pricing model (CAPM, FF three-factor model and Carhart four-factor model) to check the significance of abnormal return (alpha). T-statistics are in parentheses. '*' and '**' indicate that the profits of trading strategies are statistically significant. The sample period is January 1965 to December 2008.

Panel A: Independent Sort by Accruals and Volume (Raw Return)

	Low accruals	Medium accruals	High accruals
Low volume	0.04	-0.06	0.83**
	(0.18)	(-0.38)	(4.39)
Medium volume	0.18	0.38	0.90**
	(0.71)	(1.56)	(3.81)
High volume	0.17	0.41	1.71**
	(1.51)	(1.17)	(6.57)

Panel B: Independent Sort by Accruals and Volume (Risk Adjusted Return)

	Low accruals	Medium accruals	High accruals
		Low volume	
CAPM	0.07	-0.05	0.83**
	(0.33)	(-0.23)	(4.52)
FF three-factor	0.19	0.08	0.94**
	(0.80)	(0.39)	(5.02)
Carhart four-factor	-0.48*	-0.43*	0.52**
	(-2.23)	(-2.09)	(2.94)
		Medium volume	
CAPM	0.25	0.40	0.89**
	(0.94)	(1.66)	(3.75)
FF three-factor	0.42	0.08	1.03**
	(1.60)	(0.39)	(4.31)
Carhart four-factor	-0.32	-0.43*	0.45*
	(-1.35)	(-2.09)	(2.05)
		High volume	
CAPM	0.23	0.47	1.71**
	(0.71)	(1.33)	(6.53)
FF three-factor	0.34	0.61	1.86**
	(1.03)	(1.70)	(7.04)
Carhart four-factor	-0.62*	-0.48	1.10**
	(-2.14)	(-1.57)	(4.74)

Table VII Independent Sorts by Accruals and Credit Ratings

For each month t, all stocks with available return data for months t−6 through t-1 (formation period) are divided into 9 groups based on their credit ratings equally and accruals equally. The table shows, for each group, the average returns of the momentum strategy, which involves buying the winner portfolio P10 of the best-performing 10% of the stocks based on their returns over the formation period and selling the loser portfolio P1 and holding the position for six months (t+1 through t+6). Credit ratings are measured by S&P Domestic Long Term Issuer Credit Rating. Panel A shows monthly raw return of momentum profits of 9 groups. Panel B apply alternative asset pricing model (CAPM, FF three-factor model and Carhart four-factor model) to check the significance of abnormal return (alpha). T-statistics are in parentheses. '*' and '**' indicate that the profits of trading strategies are statistically significant at the 5% and 1% levels, respectively. The sample period is June 1985 to December 2008.

Panel A: Independent Sort by Accruals and Credit Ratings (Raw return)

	Low accruals	Medium accruals	High accruals
Low ratings	0.06	-0.04	1.77**
	(0.13)	(-0.07)	(4.65)
Medium ratings	0.04	0.19	1.24**
	(0.08)	(0.47)	(3.25)
High ratings	0.02	0.10	0.39
	(0.06)	(0.35)	(1.24)

Panel B: Independent Sort by Accruals and Credit Ratings (Risk Adjusted Return)

	Low accruals	Medium accruals	High accruals
		Low ratings	
CAPM	0.15	0.02	1.80**
	(0.32)	(0.04)	(4.73)
FF three-factor	0.21	0.12	1.89**
	(0.42)	(0.22)	(4.87)
Carhart four-factor	-0.79	-1.03*	1.17**
	(-1.88)	(-2.16)	(3.40)
		Medium ratings	
CAPM	0.12	0.25	1.25**
	(0.27)	(0.63)	(3.24)
FF three-factor	0.16	0.34	1.51**
	(0.34)	(0.85)	(3.96)
Carhart four-factor	-0.80*	-0.48	0.70*
	(-2.06)	(-1.40)	(2.18)
		High ratings	
CAPM	0.01	0.10	0.38
	(0.04)	(0.33)	(1.18)
FF three-factor	0.10	0.14	0.42
	(0.28)	(0.48)	(1.29)
Carhart four-factor	-0.52	-0.61**	-0.26
	(-1.68)	(-2.76)	(-0.96)

Table VIII The Incremental Effect of Accruals on Momentum

We exclude stocks which at the end of month t are priced below $5 or are smaller than the smallest NYSE size decile. *Accruals* are previous fiscal year measures, obtained from equation (1). *MV* is the log market value of equity and *BM* is book-to-market equity based on accounting data from the fiscal year ending in calendar year t. *Credit* is measured by S&P Domestic Long Term Issuer Credit Rating.

Panel A reports Pearson (Spearman) correlations between the relevant firm-specific variables in the upper (lower) diagonal. All the correlations are statistically significant at the 1% level. The sample period is June 1985 to December 2008.

In Panel B, for each month t, all qualified stocks with return for months t−6 through t-1 (formation period) are equally divided into three groups based on residual accruals ($\varepsilon_{i,t}$) in the following equation

$$Accurals_{i,t} = \gamma_0 + \gamma_1 MV_{i,t} + \gamma_2 BM_{i,t} + \gamma_3 Turnover_{i,t} + \gamma_4 Credit_{i,t} + \varepsilon_{i,t}$$

For each group, we compute the return of the loser portfolio P1 as the equally-weighted average return over the holding period of the worst-performing 10% and the winner portfolio P10 of the best-performing 10% of the stocks based on their returns over the formation period. There is a one month lag between the formation and the holding periods. The momentum strategy involves buying the winner portfolio and selling the loser portfolio and holding the position for six months. Since the momentum strategy is implemented each month, the monthly returns represent the equally-/value-weighted average return from this month's momentum strategy and all strategies from up to five months ago. The table shows, for residual accrual group, the average returns of the momentum strategy, as well as the average return of the loser and winner portfolios.

Panel A: Pearson (Spearman) Correlations between Firm-specific Variables

Variable	Accruals	MV	BM	Turnover	Credit
Accruals		-0.046	-0.006	0.008	0.026
MV	-0.035		-0.459	0.152	-0.525
BM	-0.008	-0.474		-0.101	0.170
Turnover	0.007	0.218	-0.119		0.240
Credit	0.017	-0.508	0.158	0.219	

Panel B: Momentum Profits (Equally-/Value-weighted Raw Return) by Residual Accruals ($\varepsilon_{i,t}$)

	Low $(\varepsilon_{i,t})$				Medium $(\varepsilon_{i,t})$				High $(\varepsilon_{i,t})$			
	EW-return	t-stat	VW-return	t-stat	EW-return	t-stat	VW-return	t-stat	EW-return	t-stat	VW-return	t-stat
P10-P1 (in percent)	0.29	(0.98)	0.36	(1.16)	0.31	(1.07)	0.34	(1.21)	**0.90****	**(3.25)**	**0.88****	**(3.06)**
P1	1.02	(2.65)	0.95	(2.48)	0.91	(2.23)	0.78	(2.13)	0.44	(1.07)	0.43	(1.04)
P2	1.16	(3.42)	1.12	(3.32)	1.11	(3.74)	1.02	(3.62)	0.68	(2.48)	0.63	(2.35)
P3	1.00	(3.22)	0.96	(3.16)	1.10	(3.82)	0.99	(3.80)	0.85	(2.63)	0.82	(2.57)
P4	1.04	(3.54)	1.03	(3.54)	1.07	(3.86)	0.94	(3.81)	0.89	(3.00)	0.87	(2.97)
P5	1.08	(3.87)	1.06	(3.78)	1.10	(3.92)	1.00	(3.93)	0.88	(3.01)	0.85	(2.97)
P6	0.97	(3.06)	0.95	(3.00)	1.06	(2.94)	0.94	(2.89)	0.92	(2.69)	0.91	(2.68)
P7	1.08	(3.84)	1.04	(3.78)	1.08	(3.92)	0.97	(3.88)	0.91	(3.19)	0.88	(3.11)
P8	1.07	(3.65)	1.05	(3.63)	1.07	(3.76)	0.96	(3.75)	0.92	(3.07)	0.86	(2.99)
P9	1.20	(3.63)	1.18	(3.62)	1.13	(3.74)	1.07	(3.72)	1.23	(3.30)	1.08	(3.25)
P10	1.31	(4.47)	1.31	(3.49)	1.22	(4.32)	1.12	(3.34)	1.34	(3.70)	1.31	(3.65)

Table IX Momentum Profits Conditioning on Various Market States

For each month t, all qualified stocks with return for months t−6 through t-1 (formation period) are equally divided into three groups based on accruals. We exclude stocks which at the end of month t are priced below $5 or are smaller than the smallest NYSE size decile. For each accrual group, we compute the return of the loser portfolio P1 as the equally-weighted average return over the holding period of the worst-performing 10% and the winner portfolio P10 of the best-performing 10% of the stocks based on their returns over the formation period. There is a one month lag between the formation and the holding periods. The momentum strategy involves buying the winner portfolio and selling the loser portfolio and holding the position for six months. Since the momentum strategy is implemented each month, the monthly returns represent the equally-weighted average return from this month's momentum strategy and all strategies from up to five months ago. Each panel shows monthly raw return and risk adjusted return (applying FF three-factor model) of momentum profits sorted by three accruals to check the significance of abnormal return (alpha).

Panel A examines momentum profits during different business cycle periods. The expansion and recession months are based on the classifications made by the NBER.

Panel B reports momentum profits in up and down markets. The 12-month cumulative returns on the CRSP value-weighted market index are used as a proxy for market returns. If the 12-month lagged return on the index has been positive (negative) (skipping one month before the holding period), a holding-period month is classified as an up (down) month.

Panel C of reports results on the accruals/momentum interaction in pessimistic and optimistic market states using the monthly sentiment index constructed by Baker and Wurgler (2006, 2007) is used to classify our sample months in pessimistic and optimistic periods. Following Antoniou, Doukas and Subrahmanyam (2011), a formation period is classified as optimistic (pessimistic) if the average sentiment belongs in the top (bottom) 30% of the three-month rolling average sentiment time series. T-statistics are in parentheses. '*' and '**' indicate that the profits of trading strategies are statistically significant at the 5% and 1% levels, respectively. The sample period is January 1965 to December 2008.

Panel A: Momentum Profits under NBER Business Cycle

	Recession			Expansion		
	Low (A1)	Medium (A2)	High (A3)	Low (A1)	Medium (A2)	High (A3)
P1(in percent)	1.78	1.32	0.13	0.99	0.87	-0.02
	(2.02)	(1.57)	(0.16)	(2.16)	(2.08)	(-0.08)
P10	1.45	1.39	1.62	1.49	1.41	1.44
	(1.97)	(2.22)	(1.29)	(4.04)	(4.24)	(3.71)
P10-P1(raw return)	-0.33	0.07	1.49**	0.50	0.53*	1.46**
	(-0.52)	(0.14)	(2.98)	(1.76)	(2.02)	(6.64)
Risk adjusted return	0.16	0.43	1.84**	0.61	0.60*	1.59**
	(0.77)	(1.29)	(3.71)	(1.95)	(2.38)	(7.22)

Panel B: Momentum Profits under Up and Down Market

	Down			Up		
	Low (A1)	Medium (A2)	High (A3)	Low (A1)	Medium (A2)	High (A3)
P1 (in percent)	1.17	1.01	0.12	1.34	1.04	0.17
	(4.01)	(3.72)	(0.41)	(4.16)	(3.62)	(0.55)
P10	1.45	1.38	1.49	1.44	1.58	1.51
	(5.30)	(5.66)	(5.06)	(4.84)	(5.79)	(5.01)
P10-P1 (raw return)	0.28	0.37	1.37**	0.10	0.54*	1.34**
	(1.10)	(1.86)	(7.22)	(0.40)	(2.49)	(6.37)
Risk adjusted return	0.43	0.52	1.52**	0.19	0.62**	1.50**
	(1.79)	(1.50)	(7.93)	(0.75)	(2.78)	(7.11)

Panel C: Momentum Profits under Investor Sentiment

	Pessimistic			Optimistic		
	Low (A1)	Medium (A2)	High (A3)	Low (A1)	Medium (A2)	High (A3)
P1 (in percent)	1.26	1.15	0.36	1.19	1.11	0.19
	(3.76)	(4.01)	(1.16)	(3.74)	(3.93)	(0.64)
P10	1.66	1.39	1.65	1.56	1.68	1.59
	(5.66)	(5.38)	(5.46)	(5.46)	(4.24)	(5.34)
P10-P1 (raw return)	0.40	0.24	1.29**	0.36	0.57*	1.40**
	(1.52)	(1.09)	(5.98)	(1.45)	(2.39)	(6.30)
Risk adjusted return	0.63	0.34	1.40**	0.54*	0.76**	1.53**
	(1.77)	(1.55)	(6.28)	(2.13)	(3.18)	(6.74)

Table X: Operating Performance of the Winner and Loser:
Median of Industry-adjusted Sales Growth (in percent)

For each month t, all stocks with available return data for months t−6 through t-1 (formation period) are divided into 3 groups based on accruals. We exclude stocks which at the end of month t are priced below $5 or are smaller than the smallest NYSE size decile. For each of the 12 months in the holding period (months t+1 through t+12), we compute the cross-sectional median over each firm-level characteristic for stocks in the loser portfolio P1 and the winner portfolio P10 constructed based on the stocks' return over the formation period. The table shows the time-series average of these cross-sectional medians of each characteristic for each month of the holding period. The industry adjustment consists of subtracting from each stock characteristic the median characteristic for the industry to which the stock belongs. The median industry characteristics are recomputed each month based on the available stocks for the month. The sample period is January 1965 to December 2008.

Adjusted sales growth	Low accruals		Medium accruals		High accruals	
Month	P1	P10	P1	P10	P1	P10
-6	-0.59	-0.62	0.32	0.05	6.61	3.88
-3	-1.03	-1.12	0.44	0.11	7.75	4.76
0 (formation time t)	-1.47	-1.67	0.21	0.32	8.22	6.63
3	-1.46	-0.29	0.00	0.61	5.34	7.03
6	-1.93	0.82	-0.54	1.63	3.08	7.39
9	-2.03	2.26	-1.28	2.30	1.20	8.15
12	-1.94	3.67	-1.99	2.81	0.00	8.69

Table XI Special Items in Pre- and Post- Formation Years for Portfolios Sorted by Accruals

Mean of Industry-adjusted Special Item/Total Asset *10,000

For each month t, all stocks with available return data for months t−6 through t-1 (formation period) are divided into 3 groups based on accruals. We exclude stocks which at the end of month t are priced below $5 or are smaller than the smallest NYSE size decile. For each month of the 12 months in the holding period (months t+1 through t+12), we compute the cross-sectional median over each firm-level characteristic for stocks in the loser portfolio P1 and the winner portfolio P10 constructed based on the stocks' return over the formation period. The table shows the time-series average of these cross-sectional means of each characteristic for each month of the holding period. Special item represents unusual or nonrecurring items presented above taxes by the company. The industry adjustment consists of subtracting from each stock characteristic the median characteristic for the industry to which the stock belongs. The median industry characteristics are recomputed each month based on the available stocks for this month. The sample period is January 1965 to December 2008.

	Low accruals		Medium accruals		High accruals	
Month	P1	P10	P1	P10	P1	P10
-6	-12.56	-14.50	-5.41	-4.80	-3.85	2.56
-3	-13.17	-11.57	-4.79	-5.03	-3.86	9.12
0 (formation time t)	-14.93	-11.56	-6.18	-4.85	-3.59	10.70
3	-13.76	-11.07	-5.85	-3.84	-4.93	10.10
6	-13.53	-8.58	-7.44	-3.47	-6.50	10.50
9	-12.52	-5.16	-8.27	-2.98	-8.07	7.69
12	-13.06	-3.60	-9.24	-2.96	-9.80	6.05

Table XII Momentum Profits Sorted by Nondiscretionary and Discretionary Components of Accruals

For each month t, all qualified stocks with available return data for months t−6 through t-1 (formation period) are equally divided into three groups based on nondiscretionary (discretionary) accruals in. Based on equation (7), the prediction error is the measure of discretionary accruals and predicted value is the measure of nondiscretionary accruals. We exclude stocks which at the end of month t are priced below $5 or are smaller than the smallest NYSE size decile. For each group, we compute the return of the loser portfolio P1 as the equally-weighted average return over the holding period of the worst-performing 10% and the winner portfolio P10 of the best-performing 10% of the stocks based on their returns over the formation period. There is a one month lag between the formation and the holding periods. The momentum strategy involves buying the winner portfolio and selling the loser portfolio and holding the position for six months. Since the momentum strategy is implemented each month, the monthly returns represent the equally-weighted average return from this month's momentum strategy and all strategies from up to five months ago. Panel A and Panel B show, for nondiscretionary (discretionary) accrual group, the average returns of the momentum strategy, as well as the average return of the loser and winner portfolios. T-statistics are in parentheses. '*' and '**' indicate that the profits of trading strategies are statistically significant at the 5% and 1% levels, respectively. Panel C shows the percentage of discretionary accruals divided by total accruals across three accrual groups. The sample period is January 1965 to December 2008.

Panel A: Nondiscretionary Accruals

	Low	Medium	High	High-Low	High-Medium
P10-P1	0.42	0.39*	0.51*	0.09	0.12
(in percent per month)	(1.78)	(2.03)	(2.31)	(0.40)	(0.52)
P1	1.16	1.05	0.83	-0.33	-0.22
	(3.67)	(3.63)	(2.50)	(-1.56)	(-0.87)
P10	1.58	1.44	1.34	-0.24	-0.10
	(5.39)	(5.32)	(4.43)	(-1.07)	(-0.76)

Panel B: Discretionary Accruals

	Low	Medium	High	High-Low	High-Medium
P10-P1	0.39	0.49*	1.00**	0.61**	0.51*
(in percent per month)	(1.83)	(2.33)	(5.02)	(2.86)	(2.12)
P1	1.14	0.96	0.44	-0.70	-0.52
	(3.69)	(3.31)	(1.45)	(-2.25)	(-1.96)
P10	1.53	1.45	1.44	-0.09	-0.01
	(5.27)	(5.41)	(4.92)	(-0.37)	(-0.17)

Panel C: Percentage of Discretionary Accruals/Accruals

Sorted by accruals	Low	Medium	High
P1	35.7%	37.4%	50.1%
P10	36.8%	37.4%	41.7%