Information and Accruals Strategy: When Does the Market Mis-price Accruals? *

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Abstract

This paper hypothesizes that more active informed trading and intense information production help investors detect the low persistence of accruals, and consequently reduce the magnitude of accruals mis-pricing. Applying both the Mishkin (1983) and the hedge-portfolio tests to sub-samples sorted on the basis of a two-way classification – accruals and one of the information production measures, we find evidence showing that accruals mis-pricing is more conspicuous for stocks with high bid-ask spread, high analysts' forecast error, and low presence of sophisticated institutional investors. Accruals trading strategies restricted to those informationally "opaque" stocks can yield annualized four-factor adjusted abnormal returns (the Fama-French three factors and the momentum factor) ranging from 14% to 23%. We also find that the market does not overreact to normal accruals for firms where information production is intense and effective.

Key words: accruals mis-pricing, information, investment strategy
JEL classification: G1, M4

1. Introduction

It has been well documented that investors frequently fail to detect the lower persistence of the accrual component of earnings and thus tend to overreact to the information contained in the accruals (e.g., Sloan (1996); Subramanyam (1996); Xie (2001)). However, there is not much consensus on why investors fail to correctly price accruals. Sloan (1996) argues that the mis-pricing is due to some market participants' fixation on the total amount of reported earnings without regard for the relative magnitude of the accrual and cash flow components of earnings. Teoh et al. (1998a, 1998b) suggest that managers opportunistically manage earnings before initial public offerings (IPOs) and seasoned equity offerings (SEOs) and investors may have failed to detect this. Francis, LaFond, Olsson, and Schipper (2003) present evidence showing that accounting-based trading anomalies (including accrual anomaly) can be justified by rational investors' responses to information uncertainty. [1]

In the paper, we offer a new explanation for the ability of the accruals to predict future stock returns. If accruals mis-pricing indeed exists, we hypothesize that it should be more conspicuous for firms where information production has been *less* intense and effective. We emphasize the role of stock trading and information production in accruals mis-pricing for the following three reasons. First, when a firm's stock is traded by many sophisticated (informed) traders, more information about the firm's fundamentals will be impounded upon its stock prices. A more efficient stock market might generate more information for the market participants to detect the differential persistence of the accrual and cash flow components of earnings. Hence, it helps to reduce the errors when predicting future returns. Second, when there is lots of institutional investors in a firm's investor base and when its stock is traded by many informed

[1] Information uncertainty, according to Francis et al. (2003) means the precision or quality of an investment signal. They characterize poor (good) quality signals as having high (low) information uncertainty.

traders, the firm manager is more likely to be disciplined in her/his financial reporting practice, which reduces the manager's ability to exercise discretion opportunistically and consequently increases the informativeness of the firm's accounting numbers. This again may lead to a smaller degree of accruals mis-pricing. Third, even if we believe that managers strategically choose accruals to improve the informational value of accounting numbers (for example, see Watts and Zimmerman, 1986; Healy and Palepu, 1993), active stock trading and effective information production may substitute for this kind of practice. Thus, it may also help to reduce the discretionary use of accruals and then lessen the degree of accruals mis-pricing.

Following the existing literature on accruals pricing, we use both the Mishkin (1983) test and the hedge-portfolio test to examine: (1) whether the market rationally prices accruals with respect to their one-year-ahead earnings implications; (2) if not, whether the accruals mis-pricing is less pronounced for firms where information production has been less intense and effective (measured by high bid-ask spread, high analysts' forecast error, and low presence of institutional investors).

Consistent with previous studies, our Mishkin (1983) test results clearly show that the market overprices accruals. That is, the stock market's valuation coefficient on accruals is significantly larger than the forecasting coefficient of these accruals for one-year-ahead earnings. More interestingly, we find that the degree of overpricing varies across the measures for stock trading and information production intensity. In general, firms with lower bid-ask spread, lower analysts' forecast error, and higher institutional shareholding tend to have a smaller degree of accruals mis-pricing.

The hedge-portfolio test reveals the same results. This test forms a portfolio long in the stocks of firms in the most negative decile and short in the stocks of firms in the most positive decile of current accruals. It is shown that the hedge portfolio yields consistently positive abnormal returns in the subsequent year. More important, the positive abnormal returns are mainly driven by the stocks of firms where information production is *less* intense and effective. For example, we find that the annualized size-adjusted abnormal returns for the groups of firms with high bid–ask spread, high forecast error, or low institutional shareholding – all three of them represent inefficient information production and severer information asymmetry – are 23.01%, 16.74%, and 20.30% respectively. The marginal contribution of information production to the ability of accruals in predicting future stock returns is both statistically and economically significant.

To better understand the role of information in the context of accruals mis-pricing, we also employ a four-factor return model to calculate the abnormal returns of the hedge portfolios constructed based on accruals.[2] We find that a refined version of the accruals strategy – a strategy that only includes informationally "opaque" stocks into the hedge portfolio – can generate four-factor adjusted abnormal returns ranging from 14% to 23%. [3]

This paper contributes to the literature on accruals pricing and market efficiency in several ways. First, it provides direct evidence demonstrating the role of stock trading and information production in accruals mis-pricing. It not only goes beyond prior literature which primarily focuses on presenting evidence showing that the market overprices accruals, but also provides new evidence supporting the argument that information intermediaries do appreciate the implications of accruals for future earnings.[4] Second, this paper identifies the bid-ask spread,

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[2] The four factors are the Fama-French three factors and the momentum factor.
[3] The results depend on which information variables we use to cut the stocks.
[4] The literature divides on whether information intermediaries such as financial analysts, auditors, institutions and short-sellers appreciate the low persistence of accruals. Ali et al. (2001) and Bradshaw et al. (2001) argue that financial intermediaries do not appreciate implications of accruals for future earnings while Beneish and Vargus (2002); Collins et al. (2002) find that insiders and institutions are able to profit from accrual mis-pricing.

analysts' forecast error and institution shareholding as empirically feasible information variables to measure the intensity and efficiency of information production. It thus complements Barth and Hutton (2003) which stresses the role of financial analysts as information intermediaries. More important, using our information variables to cut stocks, we can suggest a refined accruals strategy that generates sizeable four-factor adjusted abnormal returns. Third, this paper also offers a test on the naïve investor hypothesis. If the negative association between accruals and future stock returns is indeed related to earnings fixation by naïve investors, then the magnitude of such association should be inversely related to the number of sophisticated (informed) investors. Our empirical results seem to support this hypothesis given that we present evidence showing that firms with more institutional shareholdings suffer less from accruals mis-pricing.[5]

The remainder of the paper proceeds as follows. Section 2 explores the relationship between information production and the pricing of accruals. Several testable hypotheses are derived consequently. Section 3 discusses data and variable definitions. Section 4 describes empirical tests and documents the empirical results. Section 5 discusses the profitability of accruals trading strategies when using information variables to cut stocks. It also studies how market reactions vary across both abnormal and normal accruals. Section 6 concludes the paper.

2. Information Production and the Association between Accruals and Future Stock Returns

2.1. Development of Hypotheses

Numerous studies have documented that cash flows are more persistent than accruals. As shown in Sloan (1996), Chan et al. (2001), and Xie (2001), stocks with high accruals subsequently have lower returns and under-perform stocks with low accruals. One popular interpretation of this evidence equates accruals with managerial earnings management – as

[5] Ali, Hwang and Trombley (2001) test the naïve investor hypothesis. However, they document evidence against the hypothesis. This paper differs from theirs in sample period, research design, and key explanatory variables.

managers inflate earnings above cash flows, accruals rise. Since investors fixate on reported bottom-line income, they could be temporarily fooled and fail to fully understand the low persistence of accruals. Another explanation, as suggested in Watts and Zimmerman (1986) and Healy and Palepu (1993), argues that accruals contain information about operating performance and that managers may choose accruals to improve the informational value of accounting numbers. However, the market reacts to this information slowly.

It is worth noting that the hypotheses, although all seem a bit premature, are not mutually exclusive. Identifying some stark distinctions between them is not our purpose. This paper on the contrary focuses on providing an in-depth examination of the predictive power of accruals for stock returns and studying how stock trading and information production affect the intensity of that power.

To the extent that managers manipulate earnings and earnings fixation causes investors to ignore value-relevant information about the components of earnings and to overestimate the effect of accruals, it seems likely that this effect will be most pronounced for firms where information production about the firms' fundamentals is less intense. When a firm's stock is traded by many informed traders, more information about the firm's fundamentals would be generated in the process of trading. Meanwhile, those informed traders are more sophisticated than merely responding to firm profitability. They are able to detect earnings manipulations and likely exert a stabilizing force against temporary mis-pricing in the market. Thus, the accruals mis-pricing, if any, should be smaller for the firms with more intense information production.

In the presence of sophisticated investors and active stock trading, managers, concerned with the disciplining role of the informed traders, may be forced to reduce the subjectivity of accruals. Even though we believe that managers choose accruals to improve the informational value of accounting numbers, active stock trading and intense information production may also provide more information production channels that substitute for the practice of choosing accruals to convey information, thus, reduce the discretionary use of accruals in the earnings reporting process. Based on a totally different line of reasoning, we obtain the same conclusion: the degree of accruals mis-pricing should be smaller for firms with more information production.

Interestingly, the above conclusion does not impose any specification on how exactly information production occurs - through informed traders' stock trading or the diligent research by institutional investors – and how it impacts on investors. As long as a sophisticated investor base (measured by the presence of institutional investors), active stock trading (measured by lower bid-ask spread), and more effective information production carried out by financial analysts (measured by analyst forecast error) are present, we would observe that the investors are able to detect the lower persistence of accruals and the market reacts to accruals in a more appropriate manner.

To summarize the above discussion, we have the following hypotheses:

H1: The market value relevance of earnings and accruals are higher for firms with more active stock trading and more intense information production (measured by lower bid-ask spread, higher presence of institutional investors, and lower analyst forecast error).

H2: Earnings expectations embedded in share prices more accurately reflect the higher earnings persistence attributable to cash flow component of earnings and the lower earnings persistence attributable to the accrual components for firm with more information production (again, measured by lower bid-ask spread, higher presence of institutional investors, and lower analyst forecast error).

In the rest of the paper, we use different empirical designs to test the two hypotheses.

2.2. Measurement of Information Production

To start we first specify the variables used to proxy for the intensity of information production. In this paper, we propose three stock market-based variables to measure the intensity of information production. We first use transactions level TAQ database to calculate the bid and ask spread variable – BAS. BAS is measured as the quoted bid-ask spread deflated by stock price, which is defined as the midpoint of the spread. As shown in Glosten and Milgrom (1985) and more recently, Easley and O'Hara (2001), the bid-ask spread is expected to be increasing with the degree of asymmetric information about a firm.

Our second measure of the intensity and effectiveness of information production is based on the earnings estimates provided by the I/B/E/S database. For each firm year, we calculate the analysts' forecast error - FERROR, which is defined as the absolute value of the difference between mean consensus earnings estimates and the actual earnings normalized by the actual earnings. When a firm's information production process is intense and effective, analysts following the firm's stock are more likely to agree with one another on the firm's earnings prospect. FERROE therefore is a good proxy for the intensity of a firm's information production.

Note that institutional investors are generally considered to be informed traders. Their trading and research on certain stocks surely generate a lot of information. In the paper, we define the percentage of outstanding common shares held by institutional owners at year end – IOWNER – and use it as another measure for the degree of information production.

Our main research question, which has been elaborated in Section 2.1, could now be restated as: does accruals mis-pricing vary across the three variables that measure the intensity and effectiveness of information production?

3. Data and Measurement of Variables

3.1. Sample Selection

We obtain the firm-year observations from Standard and Poor's Compustat database from 1985 to 2002. We only keep the observations for which (a) information is available to estimate the accrual and cash flow components of earnings and to estimate control variables; (b) at least 12 months of returns are available in the return measurement period beginning four months subsequent to year end on the CRSP database, to allow calculation of future stock returns.

As detailed in Section 2.2, we create three variables to measure the intensity of information production – BAS, FERROR, and IOWNER. We obtain data on the bid and ask spread from the TAQ database which only covers the period from 1993 to 2002. We match the TAQ database to Compustat and CRSP and obtain our first sample. This sample has 28,099 firm-year observations.

We then match the I/B/E/S database with Compustat and CRSP to obtain the second sample which covers the period from 1985 to 2002. Note that we intentionally exclude the firm-year observations before 1985 since analyst coverage information was not that complete. We use analyst earnings estimates to calculate the difference between consensus estimates and actual earnings. Therefore, only observations with more than one analyst earnings forecast in a given month will be included.[6] We end up with a sample with 32,522 firm-year observations.

The institutional investors' information is obtained from the Thomson Financial database. Again we focus on the period from 1985 to 2002. When we match this database with Compustat and CRSP, we obtain 49,694 firm-year observations.

3.2. Variable Measurement

[6] Note that in this paper we choose to compute the difference between the actual earnings and the consensus forecast in the eighth month of the current fiscal year (the I/B/E/S forecast period indicator is set to 1). Choosing other months yields results with the same qualitative features.

Following Dechow et al. (1995) and Sloan (1996), the accrual components of earnings are estimated based on deprecation expenses and changes in current assets (CA) other than cash and current liabilities (CL) other than debt and income tax payable (ITP):

$$Accurals = (\Delta CA - \Delta Cash) - (\Delta CL - \Delta Debt - \Delta\ ITP) - Depreciation \qquad (1)$$

where:

ΔCA = changes in current assets (Compustat item #4)

ΔCash = changes in cash and short-term investment (Compustat item #1)

ΔCL = changes in current liabilities (Compustat item #5)

ΔDebt = changes in short term debt (Compustat item #34)

Δ ITP = changes in income tax payable (Compustat item #71)

Depreciation = depreciation expenses (Compustat item #14).

The cash flow components of earnings are then estimated as:

$$CFO = EARN - Accruals \qquad (2)$$

where EARN represents income before extraordinary items (Compustat item #18), and CFO denotes the cash flows. Consistent with the existing literature, accruals and cash flows are deflated by average total assets for meaningful cross-sectional analysis.

Other key variables in our empirical test are the measure for the intensity and effectiveness of information production. As we detailed in Section 2.2, we apply three different measures to our empirical analysis – BAS, FERROR, and IOWNER. BAS is measured as the quoted bid-ask spread deflated by stock price. FERROR is defined as the absolute value of the difference between consensus earnings estimates and the actual earnings normalized by the actual earnings. Lastly, we define the percentage of outstanding common shares held by institutional owners at year end as IOWNER. We use it as another measure for the degree of information production.

Following Sloan (1996), Xie (2001) and the majority of research on accruals pricing, we compute the size-adjusted return during the twelve months beginning the fourth month after the end of the firm reporting year. The three-month lag is consistent with the 90-day statutory deadline for filing the annual report information required for the independent variables and is publicly available. We call it *SIZEAJR*. We also calculate the raw stock returns – *RETURN*.

Table 1 provides descriptive statistics on the key variables of interest for the various samples. For variables *Accruals, EARN, CFO, RETURN*, and *SIZEAJR*, we report the summary statistics for the period from 1985 and 2002. For the three measures of information production, *BAS*, *FERROR*, and *IOWNER*, we report the descriptive statistics after the various databases (i.e., TAQ, I/B/E/S, and Thomson Financials) have been matched against Compustat and CRSP. Therefore, the sample periods and numbers of observations vary across the three variables. Note that Table 1 shows that *Accruals* account for -2.8% of total assets for a typical firm and display large cross-sectional variation with a standard deviation of 11.2%.

4. Empirical Results

4.1. Information production increases the value-relevance of accounting numbers

Before we start to explore the effect of information production on the predictive ability of accruals for future returns, we first present evidence demonstrating that more information production leads to higher value-relevant relevance of accounting numbers. That is, we test Hypothesis 1. We specify the following regressions and estimate them separately:

$$SIZEAJ_{t+1} = \beta_0 + \beta_1 EARN_t + \beta_2 EARN_t{*}BAS + \varepsilon_{t+1} \qquad (3)$$

$$SIZEAJ_{t+1} = \beta_0 + \beta_1 EARN_t + \beta_2 EARN_t{*}FERROR + \varepsilon_{t+1} \qquad (4)$$

$$SIZEAJ_{t+1} = \beta_0 + \beta_1 EARN_t + \beta_2 EARN_t{*}IOWNER + \varepsilon_{t+1} \qquad (5)$$

where *SIZEAJ* is the size-adjusted one-year-ahead returns starting three months after the current fiscal year, *EARN* is the operating income before extraordinary items, and *BAS, FERROR* and *IOWNER* are the three variables we created earlier to capture the intensity of information production.

If information production indeed creates value for the users of financial statements, we expect β_2 in (3), (4) to be significantly negative and β_2 in (5) to be significantly positive. That is, investors would be more responsive to the earnings information for firms where information production is more intense and effective (measured by lower bid-ask spread, lower analysts' forecasting error, and higher presence of institutional investors).

Table 2 presents the results. Panel A of Table 2 shows the estimates from (3) where the bid-ask spread – BAS – is used as the measure for information production. β_2 is significant at the 1% level with the estimated value equal to -72.03. A one standard deviation decrease of the bid-ask spread (BAS = 0.009) will improve the earnings informativeness by 2.1% ($\beta_2 * BAS / \beta_1 = 0.021$). The result provides support for the argument that information production in the stock market helps the investors to better utilize the information contained in earnings.

Panel B and Panel C report the regression results of using FERROR and IOWNER as information production measures respectively. The same results remain: information production increases the value-relevance of earnings. Let us take the results from Panel C as an example. A one-standard deviation increase of the shareholding by institutional investors ($IOWNER = 8.7\%$) will increase the earnings informativeness by as much as 19.91% ($\beta_2 * IOWNER / \beta_1 =$ 19.91%).

Since more intense and effective information production improves the value-relevance of earnings, we want to study whether it can help investors to better detect the differential persistence of cash flow and accrual components of earnings for future earnings and future stock returns. We present our findings in the next section.

4.2. The Mishkin Test

We employ the Mishkin (1983) approach to examine whether the market rationally prices accruals with respect to their one-year-ahead earnings implications better for firms where information production is more intense and effective. We estimate the following regression system:

$$EARN_{t+1} = \gamma + \gamma 1\ CFO_t + \gamma 2\ Accruals_t + v_{t+1} \qquad (6)$$

$$SIZEAJ_{t+1} = \alpha + \beta(EARN_{t+1} - \gamma^* - \gamma 1^*\ CFO_t - \gamma 2 * Accruals_t) + \varepsilon_{t+1}. \qquad (7)$$

Equation (6) is a forecasting equation that estimates the forecast coefficients of CFO and Accruals for predicting one-year-ahead earnings. Equation (7) is a valuation equation that estimates the valuation coefficients that the market assigns to accruals and cash flows respectively.

As in Mishkin (1983), we estimate equations (6) and (7) jointly using an iterative generalized nonlinear least-squares estimation procedure, proceeding in two stages. In the first stage, we jointly estimate equations (6) and (7) without imposing any constraints on the parameters. To test whether the valuation coefficients (the ones with *) are significantly different from the forecasting coefficients, we estimate equations (6) and (7) jointly in the second stage after imposing the rational pricing constraints, $\gamma_q^* = \gamma_q$ (q = 1, 2, and 3). Mishkin shows that the following likelihood ratio statistic is asymptotically χ^2(q) distributed under the null hypothesis that the market rationally prices one or more earnings components with respect to their associations with one-year-ahead earnings:

$$2NLn(SSR^c/SSR^u),$$

where:

q = the number of rational pricing constraints imposed;

N = the number of sample observations;

Ln = natural logarithm operator;

SSR^c = the sum of squared residuals from the constrained regressions in the second stage;

SSR^u = the sum of squared residuals from the unconstrained regressions in the first stage.

We reject the rational pricing of one or more earnings components if the above likelihood ratio statistic is sufficiently large.

To test our hypothesis, we sort each of our sample into three equal-sized sub-samples based on the firm's information production intensity. We first define three sub-samples based on BAS: low, medium, and high BAS groups. We apply the procedures described above to the three samples separately and report the results in Table 3A. Our focus is to compare the coefficient estimates across the three samples sorted by BAS.

Panel A of Table 3A reports the coefficient estimates for equations (6) and (7) obtained in the first stage for the low BAS sample.[7] The valuation coefficient for CFO ($\gamma 1^*$=0.63) is smaller than the forecasting coefficient ($\gamma 1$=0.79), suggesting that the market underprices cash from operations relative to its ability to forecast one-year-ahead earnings. The valuation coefficient the market assigns to accruals, $\gamma 2^*$, is 0.82, which is much larger than the forecasting coefficient ($\gamma 2$=0.67). Note that the results from χ^2 test strongly reject the null hypothesis that $\gamma 2^* = \gamma 2$. Obviously, the market overprices accruals. Also note that ***$\gamma 2^* / \gamma 2 = 1.22$***. Literally speaking, the market overprices accruals by as much as 22% for firms with low bid-ask spread.

[7] Note that coefficient estimates for *α, β,* and *γ* are not reported because they have no bearing on the market pricing of earnings components.

Unlike Sloan (1996) and Xie (2001), we are not so much interested in establishing the evidence of accruals mis-pricing per se. Our main interest is to compare the degree of accruals mis-pricing across samples sorted by information production measures. Therefore, we repeat the above procedures in the medium BAS and high BAS sub-samples and report the results in Panel B and Panel C, respectively. We study how much $\gamma 2^*$ deviates from $\gamma 2$. The larger the deviation, the more severe the accruals mis-pricing is. The gap between $\gamma 2^*$ and $\gamma 2$ can be best measured by $\gamma 2^* / \gamma 2$. As shown in Panels B and C, $\gamma 2^* / \gamma 2$ for medium BAS and high BAS sub-samples are 1.70 and 2.12 respectively. Both are significantly higher than 1.22, which is the level for firms with low BAS. The monotonic feature of $\gamma 2^* / \gamma 2$ over the three sub-samples with different bid-ask spreads seems to suggest that information production help reduce the accruals mis-pricing.

We then sort the firm-year observations into three sub-samples based on FERROR – the analysts' forecast error. We repeat the Mishkin test and present the results in Table 3B. Panels A, B, and C show that $\gamma 2^* / \gamma 2$ are 1.06, 1.44, and 1.55 respectively for the sub-samples with low (high) FERROR (information production), medium (medium) FERROR (information production), and high (low) FERROR (information production). The monotone relationship between $\gamma 2^* / \gamma 2$ and information production again shows that although the market overestimates the persistence of accruals, such mis-pricing is less severe for firms with lower analysts' forecast error.

In Table 3C, we apply the Mishkin test to the three equal-sized samples sorted by IOWNER – the percentage of common shares owned by institutional investors. Again, we observe a monotone relationship between $\gamma 2^* / \gamma 2$ and IOWNER. Specifically, $\gamma 2^* / \gamma 2$ are 1.64, 1.29, and 1.21 respectively for firms with low (low) IOWNER (information production), medium (medium)

IOWNER (information production), and high (high) IOWNER (information production). The results so far seem to support hypothesis *H2* well.

4.3. The Hedge-Portfolio Test

If the market assigns a larger valuation coefficient to accruals relative to their forecasting coefficient, the stock prices of firms with negative accruals tend to be lower than their intrinsic value (i.e., undervalued), and the stock prices of firms with positive accruals will be higher than their intrinsic value (i.e., overvalued). Given that, a hedge portfolio that is long in the most negative accruals decile and short in the most positive accruals decile should yield positive abnormal returns in subsequent years. A test based on the hedge portfolio's performance thus can be used to test our hypothesis.

Note that the Mishkin test results already show that the accruals mis-pricing is more severe for firms with less information production (measured by higher BAS, higher FERROR, and lower IOWNER). Hence, the hedge portfolio, as described above, should generate higher abnormal returns if it is restricted to the stocks of firms with less information production.

In Table 4A stocks are assigned to 30 portfolios on the basis of a two-way classification. Stocks are first grouped at the end of each April over the sample period into one of ten deciles based on accruals. At the same time, stocks are independently classified into three groups based on BAS. We term the three sub-samples Subs 1, 2, and 3 respectively – where Sub1 has the lowest bid-ask spread and Sub 3 has the highest bid-ask spread. The intersection of the two classifications gives 30 categories: stocks are equally weighted within each group. We report size-adjusted annual buy-and hold returns for each portfolio in the first year after portfolio formation.

Table 4A shows that the average size-adjusted abnormal return for the most negative accrual decile is significantly positive (16.19 percent, t – statistic =2.30). The average size-adjusted abnormal return for the most positive accrual decile is insignificantly negative (-3.59 percent, t-statistic = 1.25). The hedge portfolio long in the most negative accruals decile and short in the most positive decile thus generates a significant return of 19.78 percent (t-statistic =3.29).[8]

We then study the effect of information production measure – BAS – on the effectiveness of the accruals strategy. On average, the most positive accruals/Sub1 stocks outperform the most positive accruals /Sub3 stocks by as much as 10.96 percent (3.09% vs 7.87%). It seems that the abnormal returns likely are driven by stocks with high bid-ask spreads (Sub3). In line with this conjecture, we find that the hedge portofolio (long in the most negative decile and short in the most positive decile) works better for Sub 3 stocks than Sub 1 stocks (size-adjusted abnormal returns: 23.01 percent vs. 15.47 percent). This not only provides support for our hypothesis that information production helps reduce the accruals mis-pricing but also suggest a way to improve the performance of accruals based trading strategy – to focus on the stocks with the least information production where mis-pricing might be the most conspicuous.

Table 4B assigns stocks based on another two-way classification. This time we use accruals and analyst forecast error – FERROR. Repeating the procedure we discussed above, we group the stocks into 30 portfolios. Table 4b shows that the accrual based trading strategy (long in the most negative accruals decile and short in the most positive accruals decile) generates a significant return of 13.22 percent (t-statistic = 4.99). [9] Again, we find the hedge returns are more

[8] Note that the hedge returns identified in our paper are higher than those in Xie (2001). This may be caused by the different samples we adopted. Especially, we match Compustat and CRSP data with TAQ, I/B/E/S, and Thomson Financial databases to obtain our samples.
[9] It is different from the one identified in Table 6 as the test was applied to a different sample.

significant for Sub 3 stocks, that is, the stocks with higher analyst forecast error (FERROR). For example, the accruals based strategy that is confined to Sub 3 stocks generates an average size-adjusted abnormal return of 16.74 percent (t-statistic = 5.15). The results are in line with our hypothesis - information production helps reduce the accruals mis-pricing.

Lastly, we conduct the two-way classification using IOWNER – our other measure for information production. Here, higher IOWNER implies more intense and effective information production and less information asymmetry. We repeat the hedge-portfolio test and report the results in Table 4C. Not surprisingly, the table shows that the average abnormal return of the hedge portfolio confined to the stocks with low institutional investor presence (low IOWNER) is much larger than that of the hedge portfolio confined to stocks with high institutional investor presence (high IOWNER) - 20.30% vs. 13.06%. The results are consistent with earlier ones.

To summarize, the hedge-portfolio test results corroborate the Mishkin test findings that although the market overprices accruals, the mis-pricing is more severe for firms with low information production.

5. Extensions

5.1. Portfolio Results Based on the Four-Factor Return Model

Our analysis in Section 4 clearly demonstrates that information production helps investors to better detect the low persistence of accruals. Thus, it reduces the magnitude of accruals mis-prcing. The hedge-portfolio test results show that an investment strategy based on the findings can generate size-adjusted abnormal returns ranging from 16.74% (when using FERROR to cut the stocks) to 23.01% (when using BAS to cut the stocks). To better assess the profitability of the accruals based trading strategy, we calculate the portfolio returns using the four-factors model (the Fame-French three factors plus momentum factor).

Again, we apply a two-way classification where accruals and the three information production variables are used to group stocks respectively. The intersection of the two classifications yields 30 portfolios.[10] After the portfolio formation, we calculate the equal-weighted monthly portfolio returns for each portfolio for the period from April of year t+1 to March of year t+2. We then run a time-series regression using the monthly portfolio returns against the Fama-French three factors and momentum factor as follows:

$$R_{pt}-R_{ft}= \alpha + \beta_1(RM_t-R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t+ \beta_4 Momentum_t +\varepsilon_t \,, \qquad (8)$$

where R_{pt} is the monthly portfolio return, R_{ft} is the risk-free rate, RM_t, SMB_t, and HML_t are the three Fama-French factors that capture market, size, and book-to-market effects respectively. Momentum captures the impact of momentum on stock returns.[11]

The intercept from the regression, α, represents the abnormal monthly return generated by holding this portfolio. We can easily obtain the annualized abnormal returns by multiplying α with 12. We then compute the abnormal return of the hedge portfolio (long in the most positive accruals decile and short in the most negative accruals decile).

Table 5A reports the results of using BAS as the information production measure. Consistent with the previous results, we find that when we confine our stock selection to the stocks in Sub3 – where the stocks have higher BAS - the accruals based trading strategy is able to generate a four-factor adjusted abnormal return as large as 23.44% (t statistic = 3,36). On the contrary, the accrual trading strategy, when applied to the stocks with lots of information production (low BAS), only generate 7.56% of abnormal returns.

[10] In the first classification, we sort the stocks into ten categories based on accruals. In the second classification, we independently assign stocks to one of three categories based on the three information production measures respectively: bid-ask spread, analysts' forecast error, and the percentage of common shares owned by institutional investors.
[11] All of the four factors are downloaded from French's personal website.

Table 5B repeats the analysis by using analysts' forecast error (FERROR) to cut the stocks. Not surprisingly, the same result remains: the accruals strategy is able to generate 14.10% (t statistic = 3.02) of the four-factor-adjusted abnormal return when applied to the stocks where the accruals mis-pricing is most conspicuous (high FERROR).

Table 5C reports the results of using IOWNER as one of the sorting criterion. Again, we find that when we apply the accruals strategy to the stocks with low IOWNER (Sub 1 stocks), the hedge portfolio is able to generate a four-factor adjusted abnormal return as high as 17.66% (t- statistic = 3.06).

5.2. The Mis-pricing of Abnormal Accruals

Xie (2001) finds that abnormal accruals are less persistent than normal accruals, which in turn, are less persistent than cash from operations. As a result of this, the degree of abnormal accruals overpricing is arguably more severe. In this section, we study the impact of *information production* on earning implications of normal and abnormal accruals. Following the extant literature, we use the modified Jones model (1991) to calculate normal and abnormal accruals. We then apply the Mishkin test to the three sub-samples sorted based on BAS. Table 6 presents the results.

Since all of the χ^2 tests strongly reject the null hypotheses that $\gamma 2^* = \gamma 2$ and $\gamma 3^* = \gamma 3$, to simplify the exposition, we choose not to report the detailed results of these χ^2 tests. Instead, we focus on the patterns of $\gamma 2^* / \gamma 2$, and $\gamma 3^* / \gamma 3$ across the three sub-samples sorted by BAS. $\gamma 2^* / \gamma 2$ = 0.68 for stocks with low (high) bid-ask spread (information production). It seems that for the firms where information production is intense and effective, the investors are able to detect the low persistence of normal accruals and price them appropriately. However, $\gamma 3^* / \gamma 3 = 1.43$. Even for the stocks where information production is intense and effective, the market tends to overreact to abnormal accruals. The results so far seem to corroborate the findings in Xie (2001), which suggests that overpricing of total accruals is largely due to abnormal accruals.

However, when we study the stocks where information production is not that intense and effective (Sub 2 and Sub 3 stocks), we identify evidence of mis-pricing for both normal and abnormal accruals. For example, $\gamma 2^{*}/\gamma 2$ of Sub2 and Sub3 stocks are 2.24 and 2.39 respectively, which suggests that the market overprice normal accruals as well. $\gamma 3^{*}/\gamma 3$ of Sub2 and Sub3 stocks are 1.46 and 2.01 respectively. Obviously, we still observe a monotonic pattern of accruals mis-pricing (both normal and abnormal) when sorting stocks by their information production intensity.

The results from Table 6 show that both normal accruals and abnormal accruals have been mis-priced, however, the degree of mis-pricing varies with the intensity of information production. We repeat the Mishkin test in the sub-samples sorted by FERROR and IOWNER and obtain the same qualitative results. We also apply the hedge portfolio test and construct hedge portfolios based on normal accruals and abnormal accruals respectively. Slightly different from Xie (2001), we did not find evidence showing that the hedge portfolio built on abnormal accruals generate larger abnormal returns.[12] Notably, in a two-way classification, the marginal contribution of information production intensity in predicting returns exceeds the contribution of distinguishing abnormal accruals from normal accruals.

6. Conclusion

This paper examine whether the degree of accruals mis-pricing has anything to do with the measures of information production intensity. Using TAQ, I/B/E/S, and Thomson Financial institutional investors databases, we construct three different variables to measure the intensity and effectiveness of information production for a certain stock: the bid-ask spread (BAS),

[12] All of the results are available from the authors upon request.

analysts' forecast error (FERROR), and the percentage of common shares held by institutions (IOWNER). Following the extant literature, we apply both the Mishkin test and the hedge-portfolio test to the sub-samples sorted by these variables. The two tests lead to the same results: (1) overall, the market mis-price accruals; (2) accruals mis-pricing is more conspicuous for stocks where information production is less intense and effective.

More important, our results have strong implications for the accruals based trading strategies. Since accruals mis-pricing is more conspicuous for stocks with less information production, this paper shows that the hedge portfolio (long in the most negative accruals decile and short in the most positive accruals decile) can generate an average four-factor adjusted abnormal return as high as 23.44% if the stock selection is confined to the stocks with high bid-ask spread. When we use the other two information production measures - FERROR and IOWNER - to classify stocks and apply the accruals strategy, we find the same results. Thus, our results suggest ways to improve the performance of accruals strategy.

Our paper also shows that although the market does not mis-price normal accruals for stocks with low bid ask spread (high information production), it does overprice normal accruals of stocks with medium and high bid-ask spread. It thus extends the findings in Xie (2001) by introducing the marginal contribution of information production in predicting stock returns.

Last but not least, our paper echoes the extant literature and the common perception in Wall Street that earnings numbers do have different "qualities". Our results suggest that finding good proxies for firms' information production environment helps unravel the uncertainties about firms' accounting numbers and restore the effectiveness of public earnings announcements.

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Table 1
Descriptive Statistics of the Key Variables of Interest

Variables[a, b]	*Sample Period (# of obs.)*	*Mean*	*Std. Dev.*	*Minimum*	*Maximum*
Accruals	1985-2002 (49,694)	-0.028	0.112	-1.721	1.453
EARN	1985-2002 (49,694)	0.055	0.216	-28.40	0.893
CFO	1985-2002 (49,694)	0.083	0.221	-28.257	1.429
RETURN	1985-2002 (49,694)	0.156	0.875	-0.999	51.780
SIZEAJR	1985-2002 (49,694)	0.005	0.842	-2.458	51.780
BAS	1993-2002 (28,099)	0.029	0.009	0.000	1.924
FERROR	1985-2002 (32,522)	0.004	0.002	0.000	1.924
IOWNER	1985-2002 (49,694)	0.267	0.087	0.000	0.998

Notes:
[a]Variable definitions:

Accruals	= *(ΔCA - ΔCash) – (ΔCL - ΔDebt - Δ ITP) – Depreciation,* where: ΔCA = changes in current assets (Compustat item #4); ΔCash = change in cash and short-term investment (Compustat item #1); ΔCL = change in current liabilities (Compustat item #5); ΔDebt = change in short term debt (Compustat item #34); ΔITP = change in income tax payable (Compustat item #71).
EARN	= Income before extraordinary items (Compustat item #18)
CFO	= Operating income - accruals
RETRUN	= Buy-and-hold returns over a 12 month period beginning three months after the fiscal year end.
SIZEAJR	= Size adjusted buy-and-holder returns
BAS	= Bid-ask spread, difference between bid and ask prices normalized by the average of bid and ask prices during the first three months of a given year
FERROR	= Forecast error, defined as the absolute difference between mean consensus estimate and the actual earnings normalized by the actual earnings
IOWNER	= The total shares owned by the institutional investors / the total number of shares

[b]All variables except RETURN, SIZEAJR, BAS, FERROR, and IOWNER are deflated by beginning-of-year total assets (Compustat item #6)

Table 2 The Linear Regression of Size Adjusted One Year Ahead Stock Returns Against Earnings and the Interaction of Earnings and Residual of Analyst Coverage[a]

H1: The market value relevance of earnings and accruals are higher for firms with more information production (measured by BAS, FERROR, and IOWNER).

Panel A: $SIZEAJ_{t+1} = \beta_0 + \beta_1 EARN_t + \beta_2 EARN_t{*}BAS + \varepsilon_{t+1}$

(N=28,099, adjusted R-square = 0.027)

	Estimate	t- statistics	P-value
β_1	38.12	26.17	0.001
β_2	-72.03	-4.54	0.001

Panel B: $SIZEAJ_{t+1} = \beta_0 + \beta_1 EARN_t + \beta_2 EARN_t{*}FERROR + \varepsilon_{t+1}$

(N=32,522, adjusted R-square = 0.037)

	Estimate	t- statistics	P-value
β_1	47.46	46.88	0.001
β_2	-0.05	-1.89	0.050

Panel C: $SIZEAJ_{t+1} = \beta_0 + \beta_1 EARN_t + \beta_2 EARN_t{*}IOWNER + \varepsilon_{t+1}$

(N=49,694, adjusted R-square = 0.040)

	Estimate	t- statistics	P-value
β_1	27.34	26.78	0.001
β_2	62.57	15.74	0.001

Notes:
[a] For variable definitions, see Table 1.

Table 3A Nonlinear Generalized Least Squares Estimations (The Mishkin Test) of the Market Pricing of Cash from Operations and Accruals with Respect to Their Implications for One-Year-Ahead Earnings for Sub-samples Sorted by BAS[a]

$$EARN_{t+1} = \gamma + \gamma 1\ CFO_t + \gamma 2\ \ Accruals_t + v_{t+1}$$
$$SIZEAJR_{t+1} = \alpha + \beta(EARN_{t+1} - \gamma^* - \gamma 1^*\ CFO_t - \gamma 2 * Accruals_t) + \varepsilon_{t+1}$$

Panel A: Low BAS (bid-ask spread) sample (N=9362)

Forecasting Coefficients			*Valuation Coefficients*		
Parameter	*Estimate*	*Asymptotic Std. Error*	*Parameter*	*Estimate*	*Asymptotic Std. Error*
γ1 (CFO)	0.79	0.005	$\gamma 1^*$ (CFO)	0.63	0.03
γ2 (Accruals)	0.67	0.010	$\gamma 2^*$ (Accruals)	0.82	0.07

$\gamma 2^* / \gamma 2$ = 1.22	*Null Hypotheses:*	*LR Statistic[b]*	*Significant level*
	$\gamma 1^* = \gamma 1$	89.21	<0.001
	$\gamma 2^* = \gamma 2$	14.99	<0001

Panel B: Medium BAS (bid-ask spread) sample (N=9370)

Forecasting Coefficients			*Valuation Coefficients*		
Parameter	*Estimate*	*Asymptotic Std. Error*	*Parameter*	*Estimate*	*Asymptotic Std. Error*
γ1 (CFO)	0.85	0.005	$\gamma 1^*$ (CFO)	0.84	0.03
γ2 (Accruals)	0.67	0.010	$\gamma 2^*$ (Accruals)	1.14	0.06

$\gamma 2^* / \gamma 2$ = 1.70	*Null Hypotheses:*	*LR Statistic[b]*	*Significant level*
	$\gamma 1^* = \gamma 1$	0.088	<0.800
	$\gamma 2^* = \gamma 2$	175.369	<0.001

Panel B: High BAS (bid-ask spread) sample (N=9367)

Forecasting Coefficients			*Valuation Coefficients*		
Parameter	*Estimate*	*Asymptotic Std. Error*	*Parameter*	*Estimate*	*Asymptotic Std. Error*
γ1 (CFO)	*0.79*	*0.006*	$\gamma 1^*$ (CFO)	*0.97*	*0.04*
γ2 (Accruals)	*0.68*	*0.010*	$\gamma 2^*$ (Accruals)	*1.44*	*0.11*

$\gamma 2^* / \gamma 2$ = 2.12	*Null Hypotheses:*	*LR Statistic[b]*	*Significant level*
	$\gamma 1^* = \gamma 1$	58.359	<0.001
	$\gamma 2^* = \gamma 2$	220.302	<0.001

Notes:
[a] For variable definitions, see Table 1.
[b] LR Statistic = $2NLn(SSR^c/SSR^u)$

Table 3B Nonlinear Generalized Least Squares Estimations (The Mishkin Test) of the Market Pricing of Cash from Operations and Accruals with Respect to Their Implications for One-Year-Ahead Earnings for Sub-samples Sorted by FERROR[a]

$$EARN_{t+1} = \gamma + \gamma 1\ CFO_t + \gamma 2\ \ Accruals_t + v_{t+1}$$
$$SIZEAJR_{t+1} = \alpha + \beta(EARN_{t+1} - \gamma^* - \gamma 1^*\ CFO_t - \gamma 2 * Accruals_t) + \varepsilon_{t+1}$$

Panel A: Low FERROR (low forecast error) sample (N=10,837)

Forecasting Coefficients			*Valuation Coefficients*		
Parameter	*Estimate*	*Asymptotic Std. Error*	*Parameter*	*Estimate*	*Asymptotic Std. Error*
$\gamma 1$ (CFO)	0.83	0.005	$\gamma 1^*$ (CFO)	0.65	0.02
$\gamma 2$ (Accruals)	0.71	0.008	$\gamma 2^*$ (Accruals)	0.75	0.07
$\gamma 2^* / \gamma 2$ = 1.06	*Null Hypotheses:*		*LR Statistic*[b]		*Significant level*
	$\gamma 1^* = \gamma 1$		196.731		<0.001
	$\gamma 2^* = \gamma 2$		4.40		<0.050

Panel B: Medium FERROR (medium forecast error) sample (N=10,845)

Forecasting Coefficients			*Valuation Coefficients*		
Parameter	*Estimate*	*Asymptotic Std. Error*	*Parameter*	*Estimate*	*Asymptotic Std. Error*
$\gamma 1$ (CFO)	0.82	0.005	$\gamma 1^*$ (CFO)	0.84	0.02
$\gamma 2$ (Accruals)	0.70	0.010	$\gamma 2^*$ (Accruals)	1.01	0.05
$\gamma 2^* / \gamma 2$ = 1.44	*Null Hypotheses:*		*LR Statistic*[b]		*Significant level*
	$\gamma 1^* = \gamma 1$		0.114		<0.750
	$\gamma 2^* = \gamma 2$		146.094		<0.001

Panel B: High FERROR (high forecast error) sample (N=10,840)

Forecasting Coefficients			*Valuation Coefficients*		
Parameter	*Estimate*	*Asymptotic Std. Error*	*Parameter*	*Estimate*	*Asymptotic Std. Error*
$\gamma 1$ (CFO)	*0.85*	*0.005*	$\gamma 1^*$ (CFO)	*0.99*	*0.020*
$\gamma 2$ (Accruals)	*0.66*	*0.010*	$\gamma 2^*$ (Accruals)	*1.02*	*0.05*
$\gamma 2^* / \gamma 2$ = 1.55	*Null Hypotheses:*		*LR Statistic*[b]		*Significant level*
	$\gamma 1^* = \gamma 1$		95.585		<0.001
	$\gamma 2^* = \gamma 2$		178.083		<0.001

Notes:
[a] For variable definitions, see Table 1.
[b] LR Statistic = $2NLn(SSR^c/SSR^u)$

Table 3C Nonlinear Generalized Least Squares Estimations (The Mishkin Test) of the Market Pricing of Cash from Operations and Accruals with Respect to Their Implications for One-Year-Ahead Earnings for Sub-samples Sorted by IOWNER[a]

$$EARN_{t+1} = \gamma + \gamma 1\ CFO_t + \gamma 2\ Accruals_t + v_{t+1}$$
$$SIZEAJR_{t+1} = \alpha + \beta(EARN_{t+1} - \gamma - \gamma 1^*\ CFO_t - \gamma 2^*\ Accruals_t) + \varepsilon_{t+1}$$

Panel A: Low IOWNER (low institutional investors) sample (N=16,558)

Forecasting Coefficients			*Valuation Coefficients*		
Parameter	*Estimate*	*Asymptotic Std. Error*	*Parameter*	*Estimate*	*Asymptotic Std. Error*
$\gamma 1$ (CFO)	0.56	0.004	$\gamma 1^*$ (CFO)	0.50	0.038
$\gamma 2$ (Accruals)	0.58	0.008	$\gamma 2^*$ (Accruals)	0.95	0.07
$\gamma 2^*/\gamma 2$ = 1.64	*Null Hypotheses:*		*LR Statistic[b]*		*Significant level*
	$\gamma 1^* = \gamma 1$		12.737		<0.001
	$\gamma 2^* = \gamma 2$		40.469		<0.001

Panel B: Medium IOWNER (medium institutional investors) sample (N=16,565)

Forecasting Coefficients			*Valuation Coefficients*		
Parameter	*Estimate*	*Asymptotic Std. Error*	*Parameter*	*Estimate*	*Asymptotic Std. Error*
$\gamma 1$ (CFO)	0.86	0.004	$\gamma 1^*$ (CFO)	0.80	0.022
$\gamma 2$ (Accruals)	0.72	0.010	$\gamma 2^*$ (Accruals)	0.93	0.05
$\gamma 2^*/\gamma 2$ = 1.29	*Null Hypotheses:*		*LR Statistic[b]*		*Significant level*
	$\gamma 1^* = \gamma 1$		15.29		<0.001
	$\gamma 2^* = \gamma 2$		80.41		<0.001

Panel B: High IOWNER (high institutional investors) sample (N=16,561)

Forecasting Coefficients			*Valuation Coefficients*		
Parameter	*Estimate*	*Asymptotic Std. Error*	*Parameter*	*Estimate*	*Asymptotic Std. Error*
$\gamma 1$ (CFO)	*0.81*	*0.004*	$\gamma 1^*$ (CFO)	*0.76*	*0.015*
$\gamma 2$ (Accruals)	*0.71*	*0.007*	$\gamma 2^*$ (Accruals)	*0.86*	*0.030*
$\gamma 2^*/\gamma 2$ = 1.21	*Null Hypotheses:*		*LR Statistic[b]*		*Significant level*
	$\gamma 1^* = \gamma 1$		56.417		<0.001
	$\gamma 2^* = \gamma 2$		94.78		<0.001

Notes:
[a] For variable definitions, see Table 1.
[b] LR Statistic = $2NLn(SSR^c/SSR^u)$

Table 4A Accruals Strategies, Using Size-Adjusted Abnormal Returns (in One Year After Portfolio Formation) and Sorting by Accruals and BAS (Bid-ask Price)

Portfolio Ranking[a]	*All Stocks*	Bid-ask Price Class *Low BAS Sub1*	 *Medium BAS Sub2*	 *High BAS Sub3*
Lowest	16.19**	18.56***	19.45*	15.14**
	(2.30)	(2.34)	(1.82)	(2.22)
2	5.20***	4.71	8.06**	3.94
	(3.99)	(1.33)	(2.87)	(1.60)
3	9.16***	8.47*	10.83**	7.28*
	(3.45)	(1.89)	(2.62)	(1.78)
4	4.20**	6.04***	3.84	0.81
	(2.27)	(3.17)	(1.54)	(0.18)
5	5.20***	2.10	6.35**	7.99**
	(2.62)	(0.89)	(2.34)	(2.11)
6	4.00**	3.80**	3.48	4.73
	(2.45)	(2.93)	(1.08)	(1.47)
7	5.65**	10.79	5.22**	0.33
	(2.06)	(1.61)	(2.03)	(0.14)
8	3.94	9.72**	-0.80	-1.11
	(1.29)	(2.02)	(-0.55)	(-0.40)
9	-0.54	-2.20	3.23	-3.10
	(-0.19)	(-0.54)	(1.02)	(-1.60)
Highest	-3.59	3.09	-2.68	-7.87
	(-1.25)	(0.53)	(-0.78)	(-1.55)
Hedge Returns	19.78***	15.47***	22.13***	23.01**
(Long – short)	(3.29)	(2.98)	(2.52)	(2.83)
N	28,099	9362	9370	9367

*, **, and *** denote significance at the 0.10, 0.05 and 0.01 level, respectively, based on a two-tailed t-test for the annual portfolio size-adjusted abnormal returns. T-statistics in parentheses.

Notes:

[a] Portfolio deciles are formed annually based on the ranking of accruals. The hedge portofolios are formed by taking a long position in the lowest decile portfolio and a short position in the highest decile portfolio based on accruals.

Table 4B Accruals Strategies, Using Size-Adjusted Abnormal Returns (in One Year After Portfolio Formation) and Sorting by Accruals and FERROR (Forecast Error)

		Forecast Error Class		
Portfolio Ranking[a]	*All Stocks*	*Low FERROR Sub1*	*MediumFERROR Sub2*	*High FERROR Sub3*
Lowest	8.10**	13.67***	10.03**	6.15
	(2.21)	(4.41)	(2.77)	(1.24)
2	3.94**	5.66**	4.01**	2.71
	(2.40)	(2.06)	(2.88)	(1.60)
3	3.63**	10.34***	0.43	1.05
	(2.03)	(3.76)	(0.28)	(0.33)
4	3.78***	6.69***	1.17	2.63
	(2.77)	(4.14)	(0.90)	(0.93)
5	1.17	5.35***	1.02	-3.85**
	(1.31)	(3.49)	(0.78)	(-2.27)
6	0.89	5.55***	0.94	-5.16**
	(1.17)	(3.54)	(0.76)	(-2.28)
7	1.75	8.10**	0.95	-4.80
	(0.90)	(2.25)	(0.74)	(-1.52)
8	1.48	9.04**	-0.68	-6.26**
	(0.70)	(2.41)	(-0.33)	(-2.36)
9	-3.58***	3.10	-8.71***	-7.66***
	(-2.64)	(1.56)	(-5.06)	(-3.92)
Highest	-5.12*	1.80	-6.93***	-7.87**
	(-1.82)	(0.50)	(-3.15)	(-2.13)
Hedge Returns (Long – short)	13.22*** (4.99)	11.87*** (3.08)	16.96*** (4.67)	16.74** (5.15)
N	32,522	10,837	10,845	10,840

*, **, and *** denote significance at the 0.10, 0.05 and 0.01 level, respectively, based on a two-tailed t-test for the annual portfolio size-adjusted abnormal returns. T- statistics in parentheses.

[a] Portfolio deciles are formed annually based on the ranking of accruals. The hedge portofolios are formed by taking a long position in the lowest decile portfolio and a short position in the highest decile portfolio based on accruals.

Table 4C Accruals Strategies, Using Size-Adjusted Abnormal Returns (in One Year After Portfolio Formation) and Sorting by Accruals and IOWNER (Institutional Investors)

		Institutional Investors Class		
Portfolio Ranking[a]	*All Stocks*	*Low IOWNER Sub1*	*MediumIOWNER Sub2*	*High IOWNER Sub3*
Lowest	10.67***	14.03***	12.70***	9.06**
	(3.26)	(6.07)	(3.94)	(2.67)
2	7.76***	10.42**	4.56**	4.86*
	(5.28)	(2.12)	(2.07)	(1.73)
3	7.15***	9.64***	7.87***	4.69
	(3.34)	(4.47)	(3.34)	(1.59)
4	4.29*	9.33*	2.93	1.73
	(1.98)	(1.84)	(1.19)	(0.61)
5	0.96	1.06	2.91	-0.75
	(0.67)	(0.75)	(1.19)	(-0.33)
6	1.20	-0.39	3.37**	0.11
	(0.81)	(-0.24)	(2.12)	(0.03)
7	3.88***	3.97	6.74**	0.53
	(2.47)	(1.54)	(2.62)	(0.26)
8	2.95*	5.36**	-0.07	2.79
	(1.74)	(2.10)	(-0.03)	(1.07)
9	0.43	4.92	-1.07	-3.20*
	(0.24)	(1.16)	(-0.56)	(-1.98)
Highest	-4.64***	-6.27***	-3.61	-4.00
	(-2.94)	(-3.66)	(-1.51)	(-1.32)
Hedge Returns (Long – Short)	15.31*** (4.54)	20.30*** (3.44)	16.31*** (4.85)	13.06** (3.75)
N	49,694	16,558	16,565	16,561

*, **, and *** denote significance at the 0.10, 0.05 and 0.01 level, respectively, based on a two-tailed t-test for the annual portfolio size-adjusted abnormal returns. T- statistics in parentheses.

[a] Portfolio deciles are formed annually based on the ranking of accruals. The hedge portofolios are formed by taking a long position in the lowest decile portfolio and a short position in the highest decile portfolio based on accruals.

Table 5A: Accruals Strategies, Using the Four-Factor (the Fama-French three factors plus Momentum factor) adjusted Abnormal Returns (in One Year After Portfolio Formation) and Sorting by Accruals and BAS (for firms with fiscal year ending in December)

		Bid-ask Price Class		
Portfolio Ranking[a]	*All Stocks*	*Low BAS Sub1*	*Medium BAS Sub2*	*High BAS Sub3*
Lowest	18.99***	8.00***	11.81***	27.21***
	(4.08)	(2.21)	(2.54)	(4.09)
2	10.31***	8.08	7.32	14.31***
	(3.58)	(1.40)	(1.86)	(2.61)
3	8.00***	1.48	9.07***	13.15***
	(3.08)	(0.45)	(2.48)	(2.60)
4	5.04***	2.88	4.44	7.14
	(2.23)	(0.99)	(1.61)	(1.55)
5	6.74***	3.33	1.55	8.93**
	(2.94)	(1.33)	(0.51)	(1.95)
6	4.32***	1.62	5.51***	5.73**
	(2.00)	(0.58)	(2.21)	(1.93)
7	3.79	2.39	4.20	4.83
	(1.44)	(0.81)	(1.22)	(1.51)
8	3.08*	3.44	2.29	4.00
	(1.70)	(1.16)	(0.69)	(1.39)
9	3.20*	1.79	4.01	4.86
	(1.70)	(0.53)	(1.20)	(1.31)
Highest	1.58	0.44	-0.09	3.77
	(0.40)	(0.10)	(-0.02)	(0.63)
Hedge Returns	17.41***	7.56	11.90	23.44***
(Long – short)	(3.11)	(1.48)	(1.62)	(3.36)
N	16976	5658	5660	5658

*, **, and *** denote significance at the 0.10, 0.05 and 0.01 level, respectively, based on a two-tailed t-test for the annual portfolio size-adjusted abnormal returns. t-statistics in parentheses.

[a] A two-way classification is applied to sort the stocks. We first sort the stocks into deciles based on accruals. We then independently assign a stock to one of three categories based on bid ask price – BAS. The intersection of these two ranks gives 30 portfolios each year. We compute equal-weighted monthly portfolio returns for the period from April of year t+1 to March of t+2. We then run the regression: $R_{pt}\text{-}R_{ft}=\alpha+\beta_1(RM_t\text{-}R_{ft})+\beta_2 SMB_t+\beta_3 HML_t+\beta_4 Momentum_t+\varepsilon_t$. The intercept from this regression is the abnormal monthly return for the portfolio. When it is multiplied by 12, we obtain annualized abnormal returns. The rest of practice is the same as Table 4.

Table 5B. Accruals Strategies, Using the Four-Factor (the Fama-French three factors plus Momentum factor) adjusted Abnormal Returns (in One Year After Portfolio formation) and Sorting by Accruals and FERROR (for firms with fiscal year ending in December)

		Forecast Error Class		
Portfolio Ranking[a]	*All Stocks*	*Low FERROR Sub1*	*MediumFERROR Sub2*	*High FERROR Sub3*
Lowest	5.03**	6.63***	4.11	2.23
	(2.11)	(4.60)	(1.31)	(0.78)
2	2.89	4.54***	1.48	1.80
	(1.67)	(2.08)	(0.63)	(0.78)
3	3.20**	8.58***	4.39***	2.15
	(2.46)	(5.05)	(2.28)	(0.94)
4	3.54**	6.06***	1.30	2.29
	(1.99)	(2.88)	(0.70)	(0.86)
5	2.15*	4.48***	3.57***	-2.02
	(1.72)	(2.67)	(2.02)	(-0.88)
6	2.33	5.50***	2.39	-1.15
	(1.61)	(3.28)	(1.42)	(-0.44)
7	3.60	6.98***	-0.16	-2.73
	(1.12)	(4.25)	(-0.09)	(-0.71)
8	3.19**	6.89***	1.49	0.72
	(2.46)	(4.99)	(0.78)	(0.26)
9	-2.73	0.68	-3.53	-4.34**
	(-1.14)	(0.33)	(-1.15)	(-1.92)
Highest	-6.37***	-1.76	-6.21***	-11.87***
	(-3.33)	(-0.70)	(-2.58)	(-3.85)
Hedge Returns	11.40**	8.39	10.32***	14.10***
(Long – short)	(2.02)	(1.40)	(2.63)	(3.02)
N	22,067	7355	7357	7355

*, **, and *** denote significance at the 0.10, 0.05 and 0.01 level, respectively, based on a two-tailed t-test for the annual portfolio size-adjusted abnormal returns. T- statistics in parentheses.

[a] A two-way classification is applied to sort the stocks. We first sort the stocks into deciles based on accruals. We then independently assign a stock to one of three categories based on analysts' forecast error - FERROR. The intersection of these two ranks gives 30 portfolios each year. We compute equal-weighted monthly portfolio returns for the period from April of year t+1 to March of t+2. We then run the regression:

$$R_{pt}-R_{ft}=\alpha+\beta_1(RM_t-R_{ft})+\beta_2 SMB_t+\beta_3 HML_t+\beta_4 Momentum_t+\varepsilon_t.$$

The intercept from this regression is the abnormal monthly return for the portfolio. When it is multiplied by 12, we obtain annualized abnormal returns. The rest of practice is the same as Table 4.

Table 5C. Accruals Strategies, Using the Four-Factor (the Fama-French three factors plus Momentum factor) adjusted Abnormal Returns (in One Year After Portfolio formation) and Sorting by Accruals and IOWNER (for firms with fiscal year ending in December)

		Institutional Investors Class		
Portfolio Ranking[a]	*All Stocks*	*Low IOWNER Sub1*	*MediumIOWNER Sub2*	*High IOWNER Sub3*
Lowest	4.68	8.39	7.57	4.07
	(1.26)	(1.54)	(1.68)	(1.13)
2	5.72*	7.36	8.18***	6.28***
	(1.83)	(1.66)	(2.30)	(3.13)
3	3.98**	0.83	7.77***	4.42***
	(2.07)	(0.22)	(2.83)	(2.56)
4	4.17***	3.64	6.87***	2.26
	(3.14)	(1.21)	(3.15)	(1.33)
5	4.31**	2.66	8.19***	1.79
	(2.27)	(0.78)	(2.99)	(0.92)
6	1.40	0.00	2.55	1.28
	(0.98)	(0.00)	(1.22)	(0.35)
7	2.14	3.15	1.31	0.56
	(1.55)	(1.05)	(0.57)	(0.35)
8	1.60	-0.82	8.38***	1.97
	(1.24)	(-0.26)	(2.13)	(1.13)
9	-0.61	0.28	2.40	-1.84
	(-0.24)	(0.08)	(0.76)	(-0.99)
Highest	-7.68***	-9.27**	-2.87	-6.73***
	(-3.17)	(-2.41)	(-0.97)	(-3.00)
Hedge Returns (Long – Short)	12.36*** (2.53)	17.66*** (3.06)	10.44 (1.43)	10.80 (1.48)
N	47.044	15,681	15,682	15,681

*, **, and *** denote significance at the 0.10, 0.05 and 0.01 level, respectively, based on a two-tailed t-test for the annual portfolio size-adjusted abnormal returns. T- statistics in parentheses.

[a] A two-way classification is applied to sort the stocks. We first sort the stocks into deciles based on accruals. We then independently assign a stock to one of three categories based on IOWNER. The intersection of these two ranks gives 30 portfolios each year. We compute equal-weighted monthly portfolio returns for the period from April of year t+1 to March of t+2. We then run the regression: $R_{pt}\text{-}R_{ft}=\alpha+\beta_1(RM_t\text{-}R_{ft})+\beta_2 SMB_t+\beta_3 HML_t+\beta_4 Momentum_t+\varepsilon_t$. The intercept from this regression is the abnormal monthly return for the portfolio. When it is multiplied by 12, we obtain annualized abnormal returns. The rest of practice is the same as Table 4.

Table 6 Nonlinear Generalized Least Squares Estimations (The Mishkin Test) of the Market Pricing of CFO, Normal Accruals, and Abnormal Accruals with Respect to Their Implications for One-Year-Ahead Earnings for Sub-samples Sorted by BAS[a]

$EARN_{t+1} = \gamma + \gamma 1\ CFO_t + \gamma 2\ \ Normal\ \ Accruals_t + \gamma 3\ \ Abnormal\ Accruals + v_{t+1}$

$SIZEAJR_{t+1} = \alpha + \beta(EARN_{t+1} - \gamma^{*} - \gamma 1^{*}\ CFO_t - \gamma 2 * Normal\ Accruals - \gamma 3 * Abnormal\ Accruals) + \varepsilon_{t+1}$

Panel A: Low BAS (bid-ask spread) sample (N=9362)

Forecasting Coefficients			*Valuation Coefficients*		
Parameter	*Estimate*	*Asymptotic Std. Error*	*Parameter*	*Estimate*	*Asymptotic Std. Error*
γ1 (CFO)	0.80	0.005	$\gamma 1^{*}$ (CFO)	0.62	0.032
γ2 (N. Accruals)	0.63	0.020	$\gamma 2^{*}$ (N. Accruals)	0.43	0.123
γ3 (A. Accruals)	0.69	0.013	γ3* (A. Accruals)	0.99	0.085

$\gamma 2^{*} / \gamma 2 = 0.68$
$\gamma 3^{*} / \gamma 3 = 1.43$

Panel B: Medium BAS (bid-ask spread) sample (N=9370)

Forecasting Coefficients			*Valuation Coefficients*		
Parameter	*Estimate*	*Asymptotic Std. Error*	*Parameter*	*Estimate*	*Asymptotic Std. Error*
γ1 (CFO)	0.86	0.006	$\gamma 1^{*}$ (CFO)	0.85	0.031
γ2 (N. Accruals)	0.59	0.021	$\gamma 2^{*}$ (N. Accruals)	1.32	0.119
γ3 (A. Accruals)	0.71	0.014	γ3* (A. Accruals)	1.04	0.077

$\gamma 2^{*} / \gamma 2 = 2.24$
$\gamma 3^{*} / \gamma 3 = 1.46$

Panel B: High BAS (bid-ask spread) sample (N=9367)

Forecasting Coefficients			*Valuation Coefficients*		
Parameter	*Estimate*	*Asymptotic Std. Error*	*Parameter*	*Estimate*	*Asymptotic Std. Error*
γ1 (CFO)	*0.80*	*0.006*	$\gamma 1^{*}$ (CFO)	*0.97*	*0.04*
γ2 (N. Accruals)	*0.56*	*0.010*	$\gamma 2^{*}$ (N. Accruals)	*1.34*	*0.11*
γ3 (A. Accruals)	*0.74*	*0.018*	γ3* (A. Accruals)	*1.49*	*0.13*

$\gamma 2^{*} / \gamma 2 = 2.39$
$\gamma 2^{*} / \gamma 2 = 2.01$

Notes:
[a] For variable definitions, see Table 1.