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JEL Codes: G12; G14; M41

Keywords: Accruals; Anomalies; Asset pricing; Investor attention; Market efficiency

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I. INTRODUCTION

The accrual anomaly is an important puzzle in financial markets. It reflects the significant negative correlation between accruals and the cross-section of size-adjusted abnormal returns. However, the correlation is difficult to explain with existing asset pricing models (Fama and French, 2016, Hou et al., 2015, Lewellen, 2010). The anomaly was first identified in U.S. (Sloan, 1996), and similar effects are found over time and across the world (Clinch et al., 2012, Doukakis and Papanastasopoulos, 2014, Kim et al., 2015, Koerniadi and Tourani-Rad, 2007, LaFond, 2005, Pincus et al., 2007). Several studies also suggest a significant accrual anomaly in the Chinese stock market (Jiang et al., 2006, Li et al., 2011, Lin et al., 2012, Song and Li, 2009, Wang, 2005).

Previous studies attempt to explain the anomaly with the efficient market hypothesis (Ball et al., 2016, Desai et al., 2004, Wu et al., 2010) or in terms of market inefficiency (Dechow and Ge, 2006, Hirshleifer et al., 2012, Mashruwala et al., 2006, Sloan, 1996). However, theories explaining the accrual anomaly are mainly based on the U.S. market. Studies on Chinese market thus take ideas from articles focusing on the U.S. market and propose several candidate indicators (Fan et al., 2009, Zhong and Shao, 2013, Wang, 2016). In addition to the above explanations, a specific characteristic of the Chinese A-share market is examined in this study. Individual investors' behavior is relatively irrational and leads to low market efficiency (Ying et al., 2015), and introduces investor structure (the proportion of institutional investors) to explain the accrual anomaly, as a proxy indicator of investor attention (Rao et al., 2012).

Both the traditional Fama-MacBeth regression and the decomposition method of Hou and Loh (2016) are applied to evaluate the candidate explanations for the accrual anomaly in the Chinese stock market. We find that the indicator of investor attention best explains the accrual anomaly, with an explanatory power of about 50%. That is to say, the mispricing of corporate accruals by investors is the main reason for the accrual anomaly in China. The equity growth (*EG*) factor accounts for about 10% of the anomaly, and the capital investment (*CPI*) factor explains 6%, while other indicators have limited influence (less than 5%).

This study makes two main contributions. First, unlike Huang et al. (2018), who find that in the U.S. market the largest contributor is cash-based operating profitability (*CbOP*), which is an indicator based on the efficient market hypothesis, we find that the main driver of accrual anomaly in the Chinese market is the mispricing of corporate accruals by investors. Second, by quantifying the contribution of each explanation, we can assess the overall progress in the current research and provide a reference for future research in the field.

The rest of the paper is organized as follows. In Section Ⅱ the current literature on the accrual anomaly in the Chinese market and candidate explanations for the anomaly are reviewed, the methods introduced, and the data summarized. Section Ⅲ gives the empirical results and Section Ⅳ concludes the paper.

II. CONCEPTUAL FRAMEWORK, METHODS, AND DATA

A. Accruals and accrual anomaly

The concept of accruals is important in accounting, as accrual-based accounting enables companies to determine their income and expenses during a period according to rights and responsibilities. No matter whether cash is received or paid, all income and expenses generated by business activities in the current period should be treated as income or expenses for that period. Accruals reflect the difference between cash-based and accrual-based earnings (non-cash receipts and payments). Accounting earnings can thus be categorized into cash profit (cash receipts and payments) and accruals (the unrealized fraction).

Accrual-based indicators have both advantages and disadvantages. Accrual-based accounting can provide a scientific measure of business performance during a period (Dechow, 1994). In cash-based accounting, companies determine their income and expenses during a period only if cash is received or paid. However, compared with cash-based earnings, accrual-based profitability is easier to manipulate and contains less information about stocks (Ball et al., 2016).

The accrual anomaly was first identified in the U.S. (Sloan, 1996). After dividing companies into groups according to accrual-to-asset ratio, Sloan (1996) finds that the larger the fraction of accruals, the lower the size-adjusted excess returns of the company's shares. Researchers use several asset pricing models to attempt to explain the accrual anomaly, but none provide adequate explanations (Fama and French, 2016, Hou et al., 2015).

Disagreements arise over the existence of the accrual anomaly in the Chinese stock market. Some studies show that there is no significant accrual anomaly, such as Liu (2003), who follows the methods of Sloan (1996) and finds that the excess annual returns on the portfolios formed by ranking firms on the magnitude of the accrual component of earnings is relatively low (3.1%), and much less than Sloan's finding (10.4%). Subsequently, Liu (2004) further constructs portfolios using discretionary accruals, and the excess annual return remains low (1.83%). Peng and Huang (2007) also argue that the negative correlation between excess return and accruals is not significant.

However, other studies reach the opposite conclusion. After excluding companies from Chinese A-share companies with special treatment (ST) or particular transfer (PT), Wang (2005) builds portfolios following the method of Sloan (1996). The annual excess return appears to be 9.7%, close to that in the U.S. market. Jiang et al. (2006) point out that investors cannot fully understand the valuation implications of the difference of earnings prepared under CAS (Chinese Accounting Standards) and IAS (International Accounting Standards) in China, which lead to the accrual anomaly. Li et al. (2011) argue that overreactions to the accruals cannot be found under their whole sample. However, after removing deficit companies, the excess returns increase sharply. It is not because of the investors' correct pricing, but the unique 'delisting regulation' in China. Song and Li (2009) explore the accrual anomaly with the Fama-MacBeth regression. The results show that there does exist an accrual anomaly in the Chinese stock market, but the mispricing of earnings and the components of earnings in China are inconsistent with those in the U.S. Lin et al. (2012) also find a significant negative correlation between the excess returns of size-B/M-matched portfolios and accruals, and suggest that accruals reflect managers' manipulation of earnings.

B. Candidate explanations for the accrual anomaly

The accrual anomaly is defined as the existence of an alpha benefit after controlling for market risk factors. The test of an anomaly is typically a joint test of the existence of alpha and the specification of the asset pricing model. That is, the anomaly may be not a real phenomenon and may be simply due to the use of incorrect market risk factors. The explanation of the existence of a capital market anomaly therefore has two potential starting points: first, the asset pricing model is misspecified and the fraction explained by market factors is incorrectly classified as alpha. In this case, we assume that the market is efficient. If using the correct asset pricing model, the anomaly will disappear. Second, the model used is correct, but there are unavoidable facts (e.g., market friction, limits to arbitrage, irrational investors) leading to market inefficiency.

From these two points, the candidate explanations for accrual anomaly can also be divided into two categories. One group is based on the efficient market hypothesis and argues that the accrual anomaly is due to the misspecified asset pricing model; the other is based on the market inefficiency.

Explanations for the accrual anomaly in the Chinese stock market mainly stem from relevant articles focusing on the U.S. market, and are based on the efficient market hypothesis or market inefficiency. In the former group, the existence of the accrual anomaly is due to the misspecification of the asset pricing model under the framework of the efficient market hypothesis; while the latter considers investors' irrationality. The investors cannot distinguish the difference between the accrual component and the cash component of earnings, which leads to the mispricing.

The first group explains the anomaly by introducing additional risk factors (growth, investment, etc.) Desai et al. (2004) suggest that as a measure of sales growth, cash flows from operations scaled by price (*CFO/P*) can help to explain the accrual anomaly in the U.S. market. We apply this indicator to the Chinese stock market. Fan et al. (2009) introduce sales growth (*SG*), total asset growth (*AG*), equity growth (*EG*), and investment growth (*IG*) as measures of corporate growth. They find a positive correlation between the accruals and growth indexes, while the growth indexes are negatively correlated to future stock return. The stronger the positive correlation between accruals and growth indexes the more significant the accrual anomaly. Accruals are therefore not only the accrual component of earnings, but also reflect the growth of a company, so corporate growth is a driver of the accrual anomaly.

Investment is another significant risk factor. Zhang (2007) supports the argument that the accrual anomaly is explained by the investment indicator. Wu et al. (2010) introduce investment-to-asset ratio (*I/A*) into the asset pricing model as an alternative investment factor, and find it useful in their explanation. Wang (2016) finds that *I/A* can also reduce the magnitude of excess returns in the Chinese stock market. Zhong and Shao (2013) use capital investment (*CPI*) as a measure of investment and find that the accrual anomaly and the asset growth effect exist simultaneously in the Chinese A-share stock market. However, considering both kinds of effects for arbitrage does not provide an improvement in excess returns, and the magnitude of the accrual anomaly increases with the capital expenditure. These results suggest that the accrual anomaly may be caused by asset growth. That is, the accrual effect is a subset of a more general effect, the asset growth effect.

In the second group, it is argued that the anomaly is caused by market inefficiency. Hirshleifer et al. (2012) point out that behavioral mispricing rather than rational risk can better explain the accrual anomaly in the U.S. The mispricing is because irrational investors cannot tell the difference between the accrual and cash components of the earnings (Sloan, 1996). Liu (2003) uses the sample of Chinese listed companies to test the persistence of earnings and finds that the persistence of earnings from cash flow is greater than that of earnings from accruals. Peng and Huang (2007) provide similar results. If investors fail to distinguish the difference in persistence between the above two components, the accrual anomaly appears. Song and Li (2009) find no significant difference in mispricing among the accrual component, the cash component, and the overall earnings. Chinese investors are known to focus only on earnings and ignore any structural difference, which is referred to as "naive fixation on earnings." Shi and Zhang (2011) further compare different explanations and strongly support the earnings fixation hypothesis.

In the Chinese A-share stock market, the high proportion of individual investors is an important feature. According to the Market Performance Report of the Shenzhen Stock Exchange, over 80% of the total transactions are made by individual investors. As a result, the pricing and trading behavior of Chinese individual investors would influence the stock price directly, and further the market rationality and efficiency.

Previous studies suggest that individual investors are less rational than institutional investors, are weaker in information collection and processing, and are more likely to misprice stocks. Institutional investors contribute to weakening the anomaly and may thus increase market efficiency (Barber and Odean, 2008, Ying et al., 2015). Based on this, several studies use ownership structure as an indicator of investor attention to measure market effectiveness (Ali et al., 2008, Utama and Cready, 1997, Ying et al., 2015). Particularly in terms of the accrual anomaly, irrational investors cannot distinguish the difference between cash and accrual components of earnings, which can lead to further mispricing (Sloan, 1996). For example, Rao et al. (2012) reveal that low-attention (individual) investors are more likely to misprice stocks (overestimate the persistence of the accrual component of earnings) than high-attention (institutional) investors in the Chinese A-share stock market. Above all, we primarily choose ownership structure (the proportion of institutional ownership) as a proxy for investor attention to explain the accrual anomaly in China.

C. Methods

i. Fama-MacBeth cross-sectional regression

We first use the traditional Fama-MacBeth regression to analyze the existence and significance of accrual anomaly in the Chinese stock market. This method is the econometric foundation of Fama-French three factor model (Fama and French, 1992, 1993, 1996) and the basic model for analyzing anomalies. The parameters are estimated in two steps: first, for each single time period a cross-sectional estimation is performed. In the second step, the final coefficients are obtained as the arithmetic average of the first step coefficient estimates.

For each single time point, the cross-sectional regression is as follows:

$$r_{it} = \alpha_t + \gamma_t ACC_{it-1} + \sum_{j=1}^{k} \theta_{jt} x_{ijt} + u_{it} \quad (1)$$

Where r_{it} is the monthly return of individual stock i, ACC_{it-1} is the accruals in the previous year standardized using the book value of total assets, and x_{ij} are control variables. According to the literature (Ball et al., 2016, Novy-Marx, 2013), we introduce the natural logarithm value of the book-to-market ratio lagged by a year ($log(B/M)$), the natural logarithm value of the firm size lagged by a year ($log(Size)$), the prior 1-month return ($r_{1,1}$), and the prior year's return skipping the prior month ($r_{12,2}$), as the control variables.

The average γ_t coefficient, γ, is obtained through the above regression and used to verify the existence of the accrual anomaly. If γ is significantly negative, then the accrual anomaly exists; that is, there is a significant negative correlation between accruals and the cross-section of excess returns.

The Fama-MacBeth regression can also be applied to examine the explanatory power of candidate explanations for the accrual anomaly. The main idea is that the explanatory indicator *D* is useful if the average coefficient on accruals is no longer significant after introducing it into regression as a new control variable. The model specification is as follows:

$$r_{it} = \alpha_t + \gamma_t ACC_{it-1} + \lambda_t D_{it-1} + \sum_{j=1}^{k} \theta_{jt} x_{ijt} + u_{it} \quad (2)$$

Although this method appears easy and intuitive, it does have drawbacks. The conclusion is dichotomous and quantifying the contribution to the explanation of the puzzle is impossible. In particular, if the coefficient on accruals remains significant after adding the explanatory indicator

D, we cannot measure the explanatory fraction. Also, only one candidate explanation can be tested each time, so conducting a multivariate analysis to directly compare the contribution of different explanations is difficult.

ii. The decomposition method of Hou and Loh (2016)

Given the shortcomings of the traditional Fama-MacBeth regression, we use the decomposition method proposed by Hou and Loh (2016).

This method is based on the Fama-MacBeth cross-sectional regression. For each single month *t*, we regress the cross-sectional individual stock returns on their month *t-1 ACC* as follows:

$$R_{it} = \alpha_t + \gamma_t ACC_{it-1} + u_{it} \tag{3}$$

Where R_{it} is the stock's DGTW-adjusted return, computed according to Hou and Loh (2016). Stocks are sorted into groups according to the previous year's size, book-to-market ratio, and previous year's returns, skipping the prior month (sorted into quintiles based on each characteristic). Equal-weighted monthly returns are then calculated for each size-B/M-return-portfolio. Finally, the DGTW-adjusted return is obtained by the raw return minus the return on the characteristic-matched benchmark portfolio. The accrual anomaly does exist if the average γ_t coefficient, $\tilde{\gamma}$, is significantly negative.

Next, a candidate indicator *D* added into the market model can explain the accrual anomaly, if the indicator *D* is correlated with accruals *ACC*. We regress *ACC* on a candidate explanatory indicator *D*:

$$ACC_{it-1} = a_{t-1} + \lambda_{t-1} D_{it-1} + \mu_{it-1} \tag{4}$$

The coefficient λ_{t-1} measures the correlation between indicator *D* and accruals *ACC*. At the same time point, we use the regression coefficient estimates to decompose the accruals ACC_{it-1} into two orthogonal parts: $\lambda_{t-1}D_{it-1}$, the part of *ACC* related to indicator *D*, and $(a_{t-1}+\mu_{it-1})$, the residual part unrelated to indicator *D*.

Finally, we decompose the estimated γ_t from Eq. (3) according to the linearity of covariances:

$$\gamma_t = \frac{Cov(R_{it}, ACC_{it-1})}{Var(ACC_{it-1})} = \frac{Cov(R_{it}, \lambda_{t-1}D_{it-1} + a_{t-1} + \mu_{it-1})}{Var(ACC_{it-1})} = \gamma_t^C + \gamma_t^R \tag{5}$$

where

$$\gamma_t^C = \frac{Cov(R_{it}, \lambda_{t-1}D_{it-1})}{Var(ACC_{it-1})}, \quad \gamma_t^R = \frac{Cov(R_{it}, a_{t-1} + \mu_{it-1})}{Var(ACC_{it-1})}$$

We decompose the estimated γ_t into two corresponding orthogonal parts: γ_t^C is the part explained by indicator *D*, and γ_t^R is the unexplained part. Furthermore, γ_t^C/γ_t measures the percentage of the accrual anomaly explained by D, and γ_t^R/γ_t is the percentage left unexplained. Hou and Loh (2016) also provide approximations of the means and variances of the two fractions:

$$E\left(\frac{\gamma_t^C}{\gamma_t}\right) \approx \frac{E(\gamma_t^C)}{E(\gamma_t)}, \quad E\left(\frac{\gamma_t^R}{\gamma_t}\right) \approx \frac{E(\gamma_t^R)}{E(\gamma_t)} \tag{6}$$

$$Var\left(\frac{\gamma_t^C}{\gamma_t}\right) \approx \left(\frac{E(\gamma_t^C)}{E(\gamma_t)}\right)^2 \times \left(\frac{Var(\gamma_t^C)}{\left(E(\gamma_t^C)\right)^2} + \frac{Var(\gamma_t)}{\left(E(\gamma_t)\right)^2} - 2\frac{Cov(\gamma_t, \gamma_t^C)}{E(\gamma_t)E(\gamma_t^C)}\right) \tag{7}$$

$$Var\left(\frac{\gamma_t^R}{\gamma_t}\right) \approx \left(\frac{E(\gamma_t^R)}{E(\gamma_t)}\right)^2 \times \left(\frac{Var(\gamma_t^R)}{\left(E(\gamma_t^R)\right)^2} + \frac{Var(\gamma_t)}{\left(E(\gamma_t)\right)^2} - 2\frac{Cov(\gamma_t, \gamma_t^R)}{E(\gamma_t)E(\gamma_t^R)}\right) \tag{8}$$

Accordingly, the estimated means and variances are as follows:

$$\hat{E}\left(\frac{\gamma_t^C}{\gamma_t}\right) = \frac{\overline{\gamma_t^C}}{\overline{\gamma_t}}, \quad \hat{E}\left(\frac{\gamma_t^R}{\gamma_t}\right) = \frac{\overline{\gamma_t^R}}{\overline{\gamma_t}} \tag{9}$$

$$\widehat{Var}\left(\frac{\overline{\gamma_t^C}}{\overline{\gamma_t}}\right) = \frac{1}{T}\left(\frac{\overline{\gamma_t^C}}{\overline{\gamma_t}}\right)^2 \times \left(\frac{s_{\gamma_t^C}^2}{\left(\overline{\gamma_t^C}\right)^2} + \frac{s_{\gamma_t}^2}{\overline{\gamma_t}^2} - 2\frac{\hat{\rho}_{\gamma_t^C, \gamma_t} s_{\gamma_t^C} s_{\gamma_t}}{\overline{\gamma_t}\,\overline{\gamma_t^C}}\right) \tag{10}$$

$$\widehat{Var}\left(\frac{\overline{\gamma_t^R}}{\overline{\gamma_t}}\right) = \frac{1}{T}\left(\frac{\overline{\gamma_t^R}}{\overline{\gamma_t}}\right)^2 \times \left(\frac{s_{\gamma_t^R}^2}{\left(\overline{\gamma_t^R}\right)^2} + \frac{s_{\gamma_t}^2}{\overline{\gamma_t}^2} - 2\frac{\hat{\rho}_{\gamma_t^R, \gamma_t} s_{\gamma_t^R} s_{\gamma_t}}{\overline{\gamma_t}\,\overline{\gamma_t^R}}\right) \tag{11}$$

The decomposition method offers several important advantages over the traditional Fama-MacBeth regression.

If using the traditional approach, we evaluate the candidate indicator by adding it into the regression of returns on accruals as a control variable at time point t:

$$R_{it} = \tilde{\alpha}_t + \tilde{\gamma}_t^R ACC_{it-1} + \tilde{\gamma}_t^C D_{it-1} + \tilde{u}_{it} \tag{12}$$

If $\tilde{\gamma}_t^R$ is not significantly different from zero, the indicator *D* would explain the anomaly. Otherwise, the candidate variable does not perfectly explain the anomaly. However, we cannot measure the contribution of the variable by the difference between $\tilde{\gamma}_t^R$ and the original γ_t from Eq. (3), because the variance terms of the two coefficients $\tilde{\gamma}_t^R$ and γ_t are no longer the same. $\tilde{\gamma}_t^R$ is determined by the variation in ACC unrelated to *D*, while γ_t is determined by the variation in ACC itself. The two coefficients are thus not directly comparable. In contrast, the decomposition method can directly compare the coefficients γ_t^R and γ_t in Eq. (5), both determined by the variation in ACC, and is therefore preferable. This method thus allows us to quantify the fraction of the anomaly that is explained by a candidate indicator.

With this method we can also analyze multiple candidate indicators simultaneously by directly introducing them in the second stage. Thus, we can easily obtain the percentage of accrual anomaly explained by each candidate indicator and directly compare the contributions.

It is worth noting that even if the candidate indicator D shows a strong correlation with accruals ACC, it may only explain a small proportion of the anomaly. The intuition is that the component of accruals explained by the candidate indicator may not account for the accrual anomaly. The details are given in Appendix B.

D. Data

For the sample selection, we start with all of the companies listed on the Chinese A-share market that are available on the Wind database from January 2000 to December 2017, which is a total of 216 months. Next, we delete company observations that (1) are classified as "Financials" according to the Wind Industry Classification Standard; (2) have missing values in the explanatory variables. The total sample size is 275,362.

Considering the time lag in the publication of annual accounting statements, the indicator calculated based on accounting information is lagged by five months after the end of the fiscal year. The construction methods used in previous studies are applied. Appendix C provides the detailed construction methods for accruals (*ACC*), cash flows from operations scaled by price (*CFO/P*), sales growth (*SG*), total asset growth (*AG*), equity growth (*EG*), investment growth (*IG*), investment-to-asset ratio (*I/A*), and capital investment (*CPI*). Investor attention (*Dipec*) is constructed following the method of Rao et al. (2012). The stock is low-attention stock (*Dipec* = 1) if the proportion of institutional ownership is lower than the median and otherwise it is high-attention stock (*Dipec* = 0). Table A1 gives a statistical description of the indicators used (the original data for *CFO/P* is multiplied by 10). To avoid the influence of extreme values, the Winsor method is applied with the highest and lowest 1% values replaced by the next value counting inwards from the extremes.

III. EMPIRICAL RESULTS

A. Existence of the accrual anomaly: The Fama-MacBeth regression

First, we explore the existence of the accrual anomaly in the Chinese stock market using Fama-MacBeth cross-sectional regressions.

Table A2 shows the results, which verify the existence of the anomaly, primarily through the coefficient on the ratio of accruals to total assets (*ACC*). Columns (1) and (2) regress with the complete sample. From the results of Column (1), the coefficient on *ACC* is -1.07 and the t-statistic is -2.43, which is significant at a 5% level. Based on the regression in Column (1), Column (2) controls the industry dummies, where the absolute value of the coefficient estimate does not change much and the significance level increases (significant at a 1% level). This initially suggests that the accrual anomaly exists in the Chinese stock market. Columns (3) and (4) exclude the sample of small companies and test the existence again. The results show that the coefficients on *ACC* are -1.08 and -1.10 respectively, both significant at a 5% level, indicating that the accrual anomaly does not only exist in small companies.

B. Evaluating candidate explanations: The Fama-MacBeth regression

Next, based on the traditional Fama-MacBeth regression approach mentioned in Section Ⅱ, we further test the explanatory power of candidate explanations for the accrual anomaly in the Chinese stock market.

Tables A3 to A5 show the results of Fama-MacBeth regressions after adding the explanatory indicators. After introducing each indicator, the coefficient on *ACC* remains significant, so these indicators cannot explain the accrual anomaly perfectly. However, *CFO/P*, *EG*, *CPI*, and investor attention (*Dipec*) have some explanatory powers, while the other indicators cannot explain the anomaly at all.

Table A3 provides the results for indicators based on growth factors. Column (1) serves as a base model and does not include any explanatory indicator. Columns (2) to (6) investigate one growth index at a time. Column (2) introduces *CFO/P* as an additional risk factor and the absolute value of coefficients on *ACC* decreases compared with Column (1) (from -1.07 to -0.93 without controlling industry dummies, and from -1.14 to -1.01 after controlling industry dummies), while the absolute values of the t-statistics also decrease. However, the coefficients remain significant at a 5% level, indicating that *CFO/P* contributes to explaining the accrual anomaly. Column (3) adds *SG* into the base model. It shows that the absolute values of the coefficients on *ACC* do not decline but in fact rise to some degree, while the absolute values of the t-statistics also increase. The increase in both magnitude and significance of the accrual anomaly indicates that *SG* is not at all useful for the explanation. In Column (4), the explanatory indicator to test is total asset growth (*AG*). Here, the coefficients on *ACC* are nearly the same, while the absolute values of the t-statistics increase a little. Thus, the accrual anomaly is not at all explained by *AG*. Column (5) introduces equity growth (*EG*) into the regression. The absolute values of the coefficients decrease, and the magnitude of the decline is even greater than that of *CFO/P*. The absolute values of the t-statistics also decrease, but the significance level remains the same, showing that *EG* may contribute to explaining the anomaly. Column (6) introduces investment growth (*IG*) and the results show that the absolute values of the coefficients on *ACC* increase a little, as do the absolute values of the t-statistics. The increase in magnitude and significance of the accrual anomaly indicates that *IG* makes no contribution to explaining the anomaly. In all, *EG* makes the largest contribution to explaining the accrual anomaly in the Chinese stock market, followed by *CFO/P*.

Table A4 shows the results for the indicators based on investment factors. Based on Column (1), Column (2) introduces investment-to-asset ratio (*I/A*) as a candidate explanatory indicator. The absolute values of coefficients on *ACC* become larger, while the t-statistics also increase. Thus, the significant level changes from 5% to 1%. Therefore, we cannot use *I/A* to explain the accrual anomaly. Column (3) takes capital investment (*CPI*) as the explanatory indicator. The absolute values of the coefficients on *ACC* decrease from those in Column (1), while the t-statistics remain generally unchanged. The results show that *CPI* has a rather limited effect on the interpretation of the accrual anomaly.

In Table A5, Column (1) does not include any candidate explanatory indicators, and the results are the same as those in Columns (1) of Tables A3 and A4. To explore the explanatory power of investor attention, in addition to the dummy of the proportion of institutional ownership (*Dipec*), we also consider in Column (2) the cross term of the dummy and *ACC* (*ACC×Dipec*) as the explanatory indicators. The absolute values of the coefficients on *ACC* decrease, while the absolute values of the t-statistics and the significance level also decrease to some degree. Therefore, investor attention has some effect on explaining the accrual anomaly.

C. Evaluating candidate explanations: The decomposition method

From the above analysis, *CFO/P*, *EG*, *CPI*, and investor attention can partially explain the accrual anomaly, while the other indicators of growth and investment have rather limited effects. However, the traditional approach has an important flaw: it cannot quantify the specific contributions of the candidate indicators. Through the decomposition method of Hou and Loh (2016), we further analyze the candidate explanations above and quantify the proportions of the accrual anomaly explained by each indicator.

i. Evaluating candidate explanations one at a time

First, we analyze the candidate explanations one at a time. According to Hou and Loh (2016), as the cross-product of the dummy of investor attention and accruals (*ACC×Dipec*) contains *ACC*, *ACC* should be replaced by its decile (*ACCd*) to avoid overestimation.

In the first step of the decomposition method we regress the DGTW-adjusted return on *ACC*. We then regress *ACC* on one candidate indicator. The results show that each indicator has a significant correlation with accruals. Finally, decompose the coefficient estimate of *ACC* obtained in Stage 1 following the method explained in Section Ⅱ. The results show that investor attention (*Dipec*) best explains the accrual anomaly, *CFO/P* and *EG* have some effect on the explanation, while the others explain a limited proportion of the anomaly.

Table A6 shows that the indicator based on investor attention (*Dipec*) best explains the accrual anomaly, with an explanatory power of 48.28% and significance at the 5% level. *EG* captures 25.93% of the anomaly, which is significant at 5%, while *CFO/P* captures 12.68% (significant at 10%). The contribution of other indicators is almost zero and not significant even at the 10% level.

ii. Evaluating multiple candidate explanations at the same time

In this section, several candidate explanations are further analyzed in a unified framework. The conclusion is similar to that from the univariate analysis: investor attention (*Dipec*) remains the largest contributor, followed by *EG*, while other indicators contribute little to explaining the accrual anomaly.

In Table A7, Column (1) takes all of the candidate indicators into account. The best explanation is investor attention (*Dipec*), which explains 47.1% of the accrual anomaly and is significant at the 5% level. *EG* follows, which explains 11.71% and is only significant at the 10% level. Other indicators contribute little to the explanation in terms of both magnitude and significance. In general, the indicators based on growth explain 10% of the anomaly, those based on investment explain less than 2%, and the unexplained fraction is about 41%.

Columns (2) to (4) in Table 7 show the decomposition results in different groups of indicators.

From Column (2) we can see that among indicators based on the effective market hypothesis, *EG* is the largest contributor, which captures 20% of the anomaly and is significant at the 5% level. Column (3) gives an analysis of the group of indicators based on market inefficiency (although only investor attention is included) and the results are close to those in Column (1). To compare the candidate indicators that actually contribute to the explanation, we gather all of the positive contributors in Column (1) into a group and give the results in Column (4). Similarly, investor attention is still the most powerful candidate indicator with an explanatory power of 47.1%, *EG* explains more than 10% of the anomaly, while the others make no significant contribution. The residual proportion, which has no effective explanation, is about 35%. In conclusion, the largest contributor in the Chinese market is investor attention, an explanation based on inefficient market, followed by EG, an explanatory growth factor based on efficient market. No other indicators have any significant explanatory power. Besides, the existing explanations cannot perfectly explain the accrual anomaly.

The literature shows that the largest contributor in the U.S. is cash-based operating profitability (*CbOP*), an explanation based on an efficient market (Huang et al., 2018), which indicates that the stock market in China is relatively inefficient compared with the U.S market.

IV. CONCLUSION

In this paper, we compare the contributions of several candidate explanations to the accrual anomaly in the Chinese A-share stock market through the decomposition method of Hou and Loh (2016). The candidate explanatory indicators include: cash flows from operations scaled by price (*CFO/P*), sales growth (*SG*), total asset growth (*AG*), equity growth (*EG*), investment growth (*IG*), investment-to-asset ratio (*I/A*), capital investment (*CPI*), and investor attention. The first five indicators are growth factors and the following two are investment factors, all of which are based on the efficient market hypothesis. The explanatory indicator based on market inefficiency is the dummy for investor attention.

First, our empirical results show that the accrual anomaly does exist in the Chinese A-share stock market, as there is a significant negative correlation between accruals and the cross-section of size-adjusted abnormal returns.

Further, several candidate explanations for the anomaly are evaluated through two methods, the traditional approach using the Fama-MacBeth cross-sectional regressions, and the decomposition method of Hou and Loh (2016). The traditional approach reveals that *CFO/P*, *EG*, *CPI*, and investor attention (*Dipec*) have some explanatory power, while the other indicators cannot explain the anomaly at all.

To quantify the explanatory powers of these indicators, we use the decomposition method. The results are mainly consistent with the traditional method. The findings show that investor attention is the candidate with the largest contribution, with an explanatory power of about 50% and significant at the 5% level, indicating that the inefficient market framework is more useful in explaining the accrual anomaly in China. *EG*, a growth factor based on the efficient market hypothesis, explains over 10% (significant at the 10% level). However, none of the other indicators contribute significantly to explaining the anomaly. In addition, the residual unexplained fraction is about 35%, indicating that the accrual anomaly in the Chinese stock market has not been fully explained by the literature, and there is room for further discussion.

APPENDIX A: TABLES

Table A1 Summary statistics

Variables	Mean	SD	1st	25th	50th	75th	99th
Return (%)	1.43	13.96	-31.02	-6.74	0.5	8.36	43.73
log(B/M)	-12.81	0.74	-14.92	-13.23	-12.75	-12.31	-11.39
log(M)	15.26	1.02	13.17	14.55	15.17	15.88	18.08
ACC	0.02	0.18	-0.18	-0.01	0.02	0.06	0.24
CFO/P ($\times 10^{-9}$)	4.01	37.3	-34.07	1.13	3.13	7.02	41.15
SG (%)	18.62	48.61	-59.16	-1.85	12.16	29.27	184.91
AG (%)	17.98	38.85	-28.51	1.39	10.18	23.59	165.31
EG (%)	18.20	57.24	-50.61	1.52	5.98	14.63	270.89
IG	875.87	101509.80	-50.65	-0.52	12.05	33.19	900.02
I/A	0.13	2.12	-0.21	-0.00	0.05	0.13	0.91
CPI	0.12	0.12	0.01	0.06	0.10	0.16	0.47

Note: Table A1 presents the mean (Mean), standard deviation (SD), 1st quantile (1st), 25th quantile (25th), 50th quantile (50th), 75th quantile (75th), and 99th quantile (99th) values of the indicators from January 2000 to December 2017. The total sample size is 275,362. *log(B/M)* is the natural logarithm value of the book-to-market ratio. *log(M)* is the natural logarithm value of the firm size. *ACC* is the accruals standardized using the book value of total assets. We describe the construction of accruals, cash flows from operations scaled by price (*CFO/P*), sales growth (*SG*), total asset growth (*AG*), equity growth (*EG*), investment growth (*IG*), investment-to-asset ratio (*I/A*), and capital investment (*CPI*) in Appendix C.

Table A2 Existence of the accrual anomaly in China: Fama-MacBeth regression

Variable	Complete sample		Excluding small companies	
	(1)	(2)	(3)	(4)
ACC	**-1.07****	**-1.14*****	**-1.08****	**-1.10****
	(-2.43)	**(-2.71)**	**(-2.24)**	**(-2.40)**
log(B/M)	0.33***	0.35***	0.36**	0.39***
	(2.70)	(3.13)	(2.55)	(2.99)
log(M)	-0.46***	-0.44***	-0.36**	-0.33**
	(-3.30)	(-3.21)	(-2.57)	(-2.43)
$r_{1,1}$	-5.65***	-5.96***	-5.30***	-5.62***
	(-6.28)	(-6.78)	(-5.67)	(-6.18)
$r_{12,2}$	0.26	0.22	0.39	0.35
	(0.75)	(0.65)	(1.11)	(1.03)
Adjusted R^2	8.75%	12.21%	8.91%	13.08%
Industry	NO	YES	NO	YES

Note: Table A2 explores the existence of the accrual anomaly in Chinese A-share stock market through the traditional Fama-MacBeth cross-sectional regression. The sample period is from January 2000 to December 2017. The dependent variables are the winsorized returns, and the common control variables are the natural logarithm values of the book-to-market ratio (*log(B/M)*), the natural logarithm value of the firm size (*log(M)*), the prior 1-month return ($r_{1,1}$), and the prior year's return skipping the prior month ($r_{12,2}$). Columns (1) and (2) use the complete sample, while Columns (3) and (4) exclude small companies (those in the bottom 20% in terms of market value). Columns (2) and (4) control industry dummies. The t-statistics are reported in the correspondent parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table A3 Fama-MacBeth regressions to explain the accrual anomaly based on efficient market (growth factors)

Variable	(1)		(2)		(3)		(4)		(5)		(6)	
ACC	**-1.07****	**-1.14*****	**-0.93****	**-1.01****	**-1.20*****	**-1.26*****	**-1.08*****	**-1.13*****	**-0.89****	**-0.95****	**-1.09*****	**-1.17*****
	(-2.43)	**(-2.71)**	**(-2.21)**	**(-2.54)**	**(-2.85)**	**(-3.18)**	**(-2.68)**	**(-2.98)**	**(-2.16)**	**(-2.42)**	**(-2.62)**	**(-2.92)**
log(B/M)	0.33***	0.35***	0.35***	0.38***	0.33***	0.36***	0.33***	0.35***	0.34***	0.37***	0.32***	0.35***
	(2.70)	(3.13)	(2.89)	(3.32)	(2.80)	(3.22)	(2.72)	(3.13)	(2.81)	(3.23)	(2.69)	(3.13)
log(M)	-0.46***	-0.44***	-0.46***	-0.44***	-0.47***	-0.45***	-0.46***	-0.44***	-0.45***	-0.43***	-0.46***	-0.44***
	(-3.30)	(-3.21)	(-3.28)	(-3.18)	(-3.38)	(-3.28)	(-3.32)	(-3.22)	(-3.23)	(-3.13)	(-3.33)	(-3.24)
$r_{1,1}$	-5.65***	-5.96***	-5.64***	-5.93***	-5.69***	-5.99***	-5.74***	-6.04***	-5.72***	-6.02***	-5.65***	-5.96***
	(-6.28)	(-6.78)	(-6.28)	(-6.76)	(-6.37)	(-6.88)	(-6.43)	(-6.94)	(-6.39)	(-6.89)	(-6.29)	(-6.79)
$r_{12,2}$	0.26	0.22	0.29	0.25	0.25	0.21	0.23	0.19	0.25	0.21	0.25	0.21
	(0.75)	(0.65)	(0.83)	(0.75)	(0.74)	(0.62)	(0.68)	(0.59)	(0.72)	(0.64)	(0.73)	(0.64)
CFO/P			-0.10	-0.004								
			(-0.24)	(-0.01)								
SG					0.22**	0.21**						
					(2.36)	(2.34)						
AG							0.05	0.04				
							(0.36)	(0.31)				
EG									-0.18	-0.19*		
									(-1.57)	(-1.68)		
IG											0.01	0.01
											(0.14)	(0.25)
Adjusted R^2	8.75%	12.21%	9.08%	12.55%	8.98%	12.43%	9.18%	12.61%	9.11%	12.54%	8.91%	12.36%
Industry	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES

Note: Table A3 evaluates the candidate growth factors based on efficient market hypothesis. The dependent variables are the winsorized returns, and the common control variables are the natural logarithm value of the book-to-market ratio (*log(B/M)*), the natural logarithm value of the firm size (*log(M)*), the prior 1-month return ($r_{1,1}$), and the prior year's return skipping the prior month ($r_{12,2}$). The growth factors include cash flows from operations scaled by price (*CFO/P*), sales growth (*SG*), total asset growth (*AG*), equity growth (*EG*), and investment growth (*IG*). The construction method is described in Appendix C. The regressions without (NO) and with (YES) controlling industry dummies are both given in the table. The t-statistics are reported in the correspondent parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table A4 Fama-MacBeth regressions to explain the accrual anomaly based on efficient market (investment factors)

Variable	(1)		(2)		(3)	
ACC	**-1.07****	**-1.14*****	**-1.13*****	**-1.21*****	**-1.05*****	**-1.12*****
	(-2.43)	**(-2.71)**	**(-2.79)**	**(-3.10)**	**(-2.41)**	**(-2.71)**
log(B/M)	0.33***	0.35***	0.32***	0.35***	0.34***	0.37***
	(2.70)	(3.13)	(2.64)	(3.09)	(2.91)	(3.34)
log(M)	-0.46***	-0.44***	-0.47***	-0.45***	-0.46***	-0.44***
	(-3.30)	(-3.21)	(-3.37)	(-3.27)	(-3.32)	(-3.24)
$r_{1,1}$	-5.65***	-5.96***	-5.67***	-5.97***	-5.69***	-5.99***
	(-6.28)	(-6.78)	(-6.34)	(-6.84)	(-6.35)	(-6.84)
$r_{12,2}$	0.26	0.22	0.24	0.20	0.26	0.22
	(0.75)	(0.65)	(0.71)	(0.61)	(0.76)	(0.67)
I/A			0.13	0.14		
			(0.61)	(0.67)		
CPI					0.73*	0.66*
					(1.70)	(1.70)
Adjusted R^2	8.75%	12.21%	8.98%	12.42%	9.05%	12.46%
Industry	NO	YES	NO	YES	NO	YES

Note: Table A4 evaluates the candidate investment factors based on efficient market hypothesis. The dependent variables are the winsorized returns, and the common control variables are the natural logarithm value of the book-to-market ratio (*log(B/M)*), the natural logarithm value of the firm size (*log(M)*), the prior 1-month return ($r_{1,1}$), and the prior year's return skipping the prior month ($r_{12,2}$). The investment factors include investment-to-asset ratio (*I/A*) and capital investment (*CPI*), the construction method of which is described in Appendix C. The regressions without (NO) and with (YES) controlling industry dummies are both contained in the table. The t-statistics are reported in the correspondent parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table A5 Fama-MacBeth regression to explain the accrual anomaly based on market inefficiency (investor attention)

Variable	(1)		(2)	
ACC	**-1.07****	**-1.14*****	**-0.94***	**-1.00****
	(-2.43)	**(-2.71)**	**(-1.83)**	**(-2.12)**
log(B/M)	0.33***	0.35***	0.31***	0.34***
	(2.70)	(3.13)	(2.67)	(3.11)
log(M)	-0.46***	-0.44***	-0.50***	-0.48***
	(-3.30)	(-3.21)	(-3.77)	(-3.68)
$r_{1,1}$	-5.65***	-5.96***	-5.69***	-5.99***
	(-6.28)	(-6.78)	(-6.38)	(-6.87)
$r_{12,2}$	0.26	0.22	0.22	0.18
	(0.75)	(0.65)	(0.66)	(0.56)
Dipec			-0.15	-0.17
			(-1.19)	(-1.41)
ACC×Dipec			-0.01	-0.01
			(-0.37)	(-0.42)
Adjusted R^2	8.75%	12.21%	9.16%	12.57%
Industry	NO	YES	NO	YES

Note: Table A5 evaluates the candidate explanations of investor attention based on market inefficiency. The dependent variables are the winsorized returns, and the common control variables are the natural logarithm value of the book-to-market ratio (*log(B/M)*), the natural logarithm value of the firm size (*log(M)*), the prior 1-month return ($r_{1,1}$), and the prior year's return skipping the prior month ($r_{12,2}$). The indicator of investor attention (*Dipec*) is constructed according to Rao et al. (2012). The stock is low-attention stock (*Dipec* = 1) if the proportion of institutional ownership is lower than the median; otherwise it is high-attention stock (*Dipec* = 0). The cross-term of the dummies and *ACC* (*ACC×Dipec*) are also added into the model. The regressions without (NO) and with (YES) controlling industry dummies are both contained in the table. The t-statistics are reported in the correspondent parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table A6 Decomposing the accrual anomaly: Univariate analysis

Panel A: Efficient market (growth factor)

Stage	Description	Variable	*CFO/P*	*SG*	*AG*	*EG*	*IG*
1	DGTW-adj ret on *ACC*	*ACC*	-0.72*	-0.72*	-0.72*	-0.72*	-0.72*
			(-1.92)	(-1.92)	(-1.92)	(-1.92)	(-1.92)
2	*ACC* on candidate indicator *D*	*D*	1.44***	1.73***	3.65***	1.89***	12.2***
			(3.05)	(24.9)	(43.87)	(20.59)	(27.92)
3	Decompose Stage 1 *ACC* coefficient (%)	*D*	12.68%*	-15.67%	2.44%	25.93%**	1.09%
			(1.7)	(-1.23)	(0.19)	(2.02)	(0.15)
		Residual	87.32%***	115.7%***	97.56%***	74.07%***	98.91%***
			(11.74)	(9.11)	(7.45)	(5.76)	(13.24)

Panel B: Efficient market (investment factor)

Stage	Description	Variable	*I/A*	*CPI*
1	DGTW-adj ret on *ACC*	*ACC*	-0.72*	-0.72*
			(-1.92)	(-1.92)
2	*ACC* on candidate indicator *D*	*D*	8.85***	2.75***
			(49.66)	(10.22)
3	Decompose Stage 1 *ACC* coefficient (%)	*D*	2.03%	-0.76%
			(0.16)	(-0.22)
		Residual	97.97%***	100.76%***
			(7.87)	(29.05)

Panel C: Inefficient market (investor attention)

Stage	Description	Variable	*Dipec*
1	DGTW-adj ret on *ACC*	*ACC*	-0.72*
			(-1.92)
2	*ACC* on candidate indicator *D*	*D*	-11.94***
			(-142.79)
		Acc×D	2.18***
			(166.89)
3	Decompose Stage 1 *ACC* coefficient (%)	*D*	-74.30%
			(-0.97)
		ACC×D	122.58%
			(1.54)
		Total	48.28%**
			(2.30)
		Residual	51.72%**
			(2.47)

Note: Table A6 shows the results of the decomposition method evaluating candidate explanations one at a time. Stage 1 regresses DGTW-adjusted returns on *ACC*. Stage 2 regresses *ACC* on one type of candidate indicator. Stage 3 decomposes the coefficient on *ACC* from Stage 1, γ_t, into two parts, γ_t^C and γ_t^R. Then, we calculate the average γ_t^C/γ_t as the percentage of accruals explained by *D*, and the average γ_t^R/γ_t as the percentage of accruals left unexplained. The coefficients in Stage 2 are multiplied by 100. Panel A shows the results of candidate growth factors based on efficient market, Panel B shows the results of candidate investment factors based on efficient market, while Panel C shows the results for the investor attention explanation based on market inefficiency. The t-statistics are reported in the correspondent parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table A7 Decomposing the accrual anomaly: Multivariate analysis

Variable	(1)	(2)	(3)	(4)
Growth factors	10.22%	13.33%		16.15%**
	(1.09)	(1.11)		(2.13)
CFO/P	3.70%	9.05%		3.88%
	(1.26)	(1.64)		(1.27)
SG	-2.16%	-7.29%		
	(-0.76)	(-1.17)		
AG	-2.75%	-9.90%		
	(-0.38)	(-1.00)		
EG	11.71%*	22.79%*		12.27%*
	(1.75)	(1.79)		(1.93)
IG	-0.27%	-1.32%		
	(-0.09)	(-0.33)		
Investment factors	1.88%	7.86%		1.99%
	(0.15)	(0.49)		(0.88)
I/A	-4.11%	1.50%		
	(-0.29)	(0.09)		
CPI	5.99%	6.36%		1.99%
	(1.37)	(1.28)		(0.88)
Investor attention	47.01%**		48.28%**	47.10%**
	(2.34)		(2.30)	(2.29)
Dipec	-72.34%		-74.30%	-74.52%
	(-0.99)		(-0.97)	(-0.99)
Acc×Dipec	119.35%		122.58%	121.62%
	(1.55)		(1.54)	(1.55)
Residual	40.90%*	78.81%***	51.72%**	34.76%
	(1.82)	(4.92)	(2.47)	(1.51)

Note: Table A7 shows the results of the decomposition method when evaluating candidate explanations in groups. Column (1) evaluates all of the candidate explanations at a time, Column (2) includes indicators based on the efficient market hypothesis (growth and investment factors), Column (3) only includes indicators based on inefficient market, while Column (4) includes all of the indicators that have positive explanatory power in Column (1). The t-statistics are reported in the correspondent parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

APPENDIX B

This appendix shows why the candidate indicator D may only explain a small proportion of the accrual anomaly, even if it shows a strong correlation with accruals ACC. Consider the conventional approach to analyzing the accrual anomaly:

$$\begin{aligned} R_{it} &= \tilde{\alpha}_t + \tilde{\gamma}_t^R ACC_{it-1} + \tilde{\gamma}_t^C D_{it-1} + \tilde{u}_{it} \\ &= \tilde{\alpha}_t + \tilde{\gamma}_t^R (a_{t-1} + \lambda_{t-1} D_{it-1} + \mu_{it-1}) + \tilde{\gamma}_t^C D_{it-1} + \tilde{u}_{it} \\ &= \tilde{\alpha}_t + \tilde{\gamma}_t^R (a_{t-1} + \mu_{it-1}) + (\tilde{\gamma}_t^R \lambda_{t-1} + \tilde{\gamma}_t^C) D_{it-1} + \tilde{u}_{it} \\ &= \tilde{\alpha}_t + \tilde{\gamma}_t^R (a_{t-1} + \mu_{it-1}) + \breve{\gamma}_t^C D_{it-1} + \tilde{u}_{it} \end{aligned} \qquad \text{(B1)}$$

where $\breve{\gamma}_t^C = \tilde{\gamma}_t^C + \lambda_{t-1}\tilde{\gamma}_t^R$. The expression of γ_t^C in Eq. (5) is as follows:

$$\begin{aligned} \gamma_t^C &= \frac{Cov(R_{it}, \lambda_{t-1} D_{it-1})}{Var(ACC_{it-1})} \\ &= \frac{Cov(R_{it}, \lambda_{t-1} D_{it-1})}{Var(\lambda_{t-1} D_{it-1})} \cdot \frac{Var(\lambda_{t-1} D_{it-1})}{Var(ACC_{it-1})} \\ &= \frac{\breve{\gamma}_t^C}{\lambda_{t-1}} \cdot \frac{Var(\lambda_{t-1} D_{it-1})}{Var(ACC_{it-1})} \\ &= \left(\frac{\tilde{\gamma}_t^C}{\lambda_{t-1}} + \tilde{\gamma}_t^R\right) \cdot \frac{Var(\lambda_{t-1} D_{it-1})}{Var(ACC_{it-1})} \end{aligned} \qquad \text{(B2)}$$

As is shown in Eq. (B2), γ_t^C is not only determined by the fraction of the variation of accrual anomaly explained by the candidate indicator $\frac{Var(\lambda_{t-1} D_{it-1})}{Var(ACC_{it-1})}$, but also $\tilde{\gamma}_t^C$, the part of the candidate indicator that is uncorrelated with accruals but correlated with excess return R. Although the candidate indicator D is highly correlated with accruals ACC, if $\tilde{\gamma}_t^C$ is positive, then D will actually have a small or even negative contribution to explain the accrual anomaly.

APPENDIX C: INDICATOR CONSTRUCTION

This appendix provides in detail the construction methods of accruals, sales growth (*SG*), total asset growth (AG), equity growth (EG), investment growth (IG), cash flows from operations scaled by price (*CFO/P*), capital investment (*CPI*), and investment-to-asset ratio (*I/A*), which use construction methods from previous studies.

To calculate accruals, we adopt the approach of Ball et al. (2016).

1. Accruals

We calculate the absolute value of accruals based on the cash flow statement.

$$\begin{aligned} Accruals = & - Decrease\ in\ accounts\ receivable \\ & - Decrease\ in\ inventory \\ & - Increase\ in\ accounts\ payable\ and\ accrued\ liabilities \\ & - Net\ change\ in\ other\ assets\ and\ liabilities \\ & - Increase\ in\ accrued\ income\ tax \end{aligned}$$

We use the ratio of the value above to the total assets of the company as the index of accruals (ACC) in the study.

In terms of growth factors, we use the growth indicator in the U.S. market, cash flows from operations scaled by price (*CFO/P*), following the method of Desai et al. (2004). In addition, we adopt the method of Fan et al. (2009), which introduces sales growth (*SG*), total asset growth (AG), equity growth (*EG*), and investment growth (*IG*) as the measures of corporate growth.

2. Operating cash flow (CFO)

$$CFO = Earnings + Depreciation - Working\ capital\ accruals$$

3. Sales growth (SG)

$$SG = \frac{Prime\ operating\ revenue\ this\ year}{Prime\ operating\ revenue\ last\ year} - 1$$

4. Total asset growth (AG)

$$AG = \frac{Total\ asset\ this\ year}{Total\ asset\ last\ year} - 1$$

5. Equity growth (EG)

$$EG = \frac{Owner's\ equity\ this\ year}{Owner's\ equity\ last\ year} - 1$$

6. Investment growth (IG)

$$IG = \frac{Fixed\ assets + Construction\ in\ process + Inventory\ this\ year}{Fixed\ assets + Construction\ in\ process + Inventory\ last\ year} - 1$$

As for investment factors, we focus on two indicators, investment-to-asset ratio (*I/A*) and capital investment (*CPI*). To calculate investment-to-asset ratio (*I/A*), we follow the method of Wang (2016). In terms of capital investment (*CPI*), we use the method of Zhong and Shao (2013).

7. Investment-to-asset ratio (*I/A*)

$$I/A = \frac{(annual\ changes\ in\ gross\ property, plant\ and\ equipment + annual\ changes\ in\ inventory)}{lagged\ book\ value\ of\ assets}$$

8. Capital investment (*CPI*)

$$CPI = Cash\ payments\ for\ operating\ leases$$

$$+Cash\ paid\ for\ buying\ fixed\ assets, intangible\ assets\ and\ other\ long-term\ assets$$

$$-Net\ cash\ from\ disposing\ fixed\ assets, intangible\ assets\ and\ other\ long-term\ assets$$

REFERENCES

Ali, A., S. Klasa and O. Z. Li (2008), 'Institutional Stakeholdings and Better-informed Traders at Earnings Announcements', *Journal of Accounting and Economics*, 46, 47-61.

Ball, R., J. Gerakos, J. T. Linnainmaa and V. Nikolaev (2016), 'Accruals, Cash Flows, and Operating Profitability in the Cross Section of Stock Returns', *Journal of Financial Economics*, 121, 28-45. ‘

Barber, B. M. and T. Odean (2008), 'All That Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors', *Review of Financial Studies*, 21, 785-818.

Clinch, G., D. Fuller, B. Govendir and P. Wells (2012), 'The Accrual Anomaly: Australian Evidence', *Accounting and Finance*, 52, 377-94.

Dechow, P. M. (1994), 'Accounting Earnings and Cash Flows as Measures of Firm Performance: The Role of Accounting Accruals', *Journal of Accounting and Economics*, 18, 3-42.

Dechow, P. M. and W. Ge (2006), 'The Persistence of Earnings and Cash Flows and the Role of Special Items: Implications for the Accrual Anomaly', *Review of Accounting Studies*, 11, 253-96.

Desai, H., S. Rajgopal and M. Venkatachalam (2004), 'Value-Glamour and Accruals Mispricing: One Anomaly or Two?', *The Accounting Review*, 79, 355-85.

Doukakis, L. C. and G. A. Papanastasopoulos (2014), 'The Accrual Anomaly in the U.K. Stock Market: Implications of Growth and Accounting Distortions', *Journal of International Financial Markets, Institutions and Money*, 32, 256-77.

Fama, E. F. and K. R. French (1992), 'The Cross-Section of Expected Stock Returns', *the Journal* *of Finance*, 47, 427-65.

Fama, E. F. and K. R. French (1993), 'Common Risk Factors in the Returns on Stocks and Bonds', *Journal of Financial Economics*, 33, 3-56.

Fama, E. F. and K. R. French (1996), 'Multifactor Explanations of Asset Pricing Anomalies', *the Journal of Finance*, 51, 55-84.

Fama, E. F. and K. R. French (2016), 'Dissecting Anomalies with a Five-Factor Model', *Review of Financial Studies*, 29, 69-103.

Fan, X., H. Liu and W. Guo (2009), 'Research on the Accrual Anomaly in China's Capital Market—Based on the Perspective of Corporate Growth', *Journal of Financial Research (in Chinese)*, 5, 141-56.

Hirshleifer, D., K. Hou and S. H. Teoh (2012), 'The Accrual Anomaly: Risk or Mispricing?', *Management Science*, 58, 320-35.

Hou, K. and R. K. Loh (2016), 'Have We Solved the Idiosyncratic Volatility Puzzle?', *Journal of Financial Economics*, 121, 167-94.

Hou, K., C. Xue and L. Zhang (2015), 'Digesting Anomalies: An Investment Approach', *Review of Financial Studies*, 28, 650-705.

Huang, Z., D. Lin and Z. Qiu (2018), 'Have We Explained the Accrual Anomaly? An Evaluation Based on the Decomposition Method', *CCER Working Paper Series*.

Jiang, G., Y. Li and J. Niu (2006), 'A Study on the Difference between CAS Earnings and IAS Earnings and its Economic Consequence', *Accounting Research (in Chinese)*, 9, 27-34.

Kim, Y. J., J. H. Kim, S. Kwon and S. J. Lee (2015), 'Percent Accruals and the Accrual Anomaly: Korean Evidence', *Pacific-Basin Finance Journal*, 35, 340-66.

Koerniadi, H. and A. Tourani-Rad (2007), 'Accrual or Cash Flow Anomaly? Evidence from New Zealand', *Accounting Research Journal*, 20, 21-36.

Lafond, R. (2005), 'Is the Accrual Anomaly a Global Anomaly?', *MIT Sloan School of Management Working Paper*.

Lewellen, J. (2010), 'Accounting Anomalies and Fundamental Analysis: An Alternative View', *Journal of Accounting and Economics*, 50, 455-66.

Li, Y., J. Niu, R. Zhang and J. A. Largay Iii (2011), 'Earnings Management and the Accrual anomaly: Evidence from China', *Journal of International Financial Management & Accounting*, 22, 205-45.

Lin, S., Y. Hu, M. She and Y. Liu (2012), 'Accrual Anomaly, Earnings Quality and Stock Returns——Evidence from China', *Journal of Audit & Economics (in Chinese)*, 27, 68-77.

Liu, Y. (2003), 'The Reflection in Stock Price for the Information of Accounting Earnings and Accruals', *China Soft Science (in Chinese)*, 11, 40-45.

Liu, Y. (2004), 'A Test on the Reflection for the Information of Accounting Accruals', *Securities Market Herald (in Chinese)*, 2, 20-25.

Mashruwala, C., S. Rajgopal and T. Shevlin (2006), 'Why is the Accrual Anomaly not Arbitraged Away? The Role of Idiosyncratic Risk and Transaction Costs', *Journal of Accounting and Economics*, 42, 3-33.

Novy-Marx, R. (2013), 'The Other Side of Value: The Gross Profitability Premium', *Journal of Financial Economics*, 108, 1-28.

Peng, S. and Y. Huang (2007), 'Accounting Information Reliability and Earnings Persistence', *China Accounting Review (in Chinese)*, 5, 219-32.

Pincus, M., S. Rajgopal and M. Venkatachalam (2007), 'The Accrual Anomaly: International Evidence', *The Accounting Review*, 82, 169-203.

Rao, Y., J. Wang and Y. Ding (2012), 'The Impact of Limited Investor Attention on Accrual Mispricing: Evidence from Chinese A-share Stock Market', *Accounting Research (in Chinese)*, 5, 59-66.

Shi, L. and H. Zhang (2011), 'Can the Earnings Fixation Hypothesis Explain the Accrual Anomaly?', *Review of Accounting Studies*, 17, 1-21.

Sloan, R. G. (1996), 'Do Stock Prices Fully Reflect Information in Accruals and Cash Flows about Future Earnings?', *The Accounting Review*, 71, 289-315.

Song, Y. and Z. Li (2009), 'The Abnormality in Accrual in A-share Companies', *Management World (in Chinese)*, 8, 17-187.

Utama, S. and W. M. Cready (1997), 'Institutional Ownership, Differential Predisclosure Precision and Trading Volume at Announcement Dates', *Journal of Accounting and Economics*, 24, 129-50.

Wang, Q. (2005), 'The Impact of Earnings Quality on the Future Earnings and the Stock Returns', *Journal of Financial Research (in Chinese)*, 10, 141-52.

Wang, Y. (2016), The Reason of Accrual Anomaly in Chinese Stock Market——From the View of Corporate Investment (in Chinese). University of Electronic Science and Technology of China.

Wu, J. G., L. Zhang and X. F. Zhang (2010), 'The q-Theory Approach to Understanding the Accrual Anomaly', *Journal of Accounting Research*, 48, 177-223.

Ying, Q., D. Kong and D. Luo (2015), 'Investor Attention, Institutional Ownership, and Stock

Return: Empirical Evidence from China', *Emerging Markets Finance and Trade*, 51, 672-85.

Zhang, X. F. (2007), 'Accruals, Investment, and the Accrual Anomaly', *The Accounting Review*, 82, 1333-63.

Zhong, X. and Z. Shao (2013), 'Is Accrual Anomaly Caused by Asset Growth Effect?——Evidence from A-share Stock Market', *Finance and Accounting Monthly (in Chinese)*, 22, 6-9.