Earnings Management and IPO Anomalies in China[♣]

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Abstract

This paper examines the links between earnings management and IPO anomalies for a unique sample of 506 Chinese IPOs issued during the 1998-2003 period. The offer price is set as a multiple of earnings by the authorities and so earnings management mechanically inflates the offer price in this special setting. This generates a threshold above which we can measure the degree to which secondary market investors overreact by taking accounting accruals at face value. We find evidence consistent with the investor overreaction hypothesis. First, firms with larger managed accruals tend to perform better on the first trading day. Second, even after controlling for underpricing, firms with larger managed accruals tend to perform worse over a three-year horizon. Third, firms initially performing better tend to perform worse over a three-year horizon which indicates that the secondary-market investors do not fully understand managed accruals. These results are robust across a variety of test specifications.

JEL: G14

Keywords: IPO, underpricing, underperformance; earnings management.

1. Introduction

We empirically examine the links between earnings management and IPO anomalies for a unique sample of 506 Chinese IPOs issued over the 1998-2003 period. The Chinese new issues market has attracted great interest due to the magnitude of its underpricing. Compared to the average level of around 18% in the USA and UK, the 178% (Chan et al. 2004) realized on the first day of trading in the Chinese market is enormous. While most Chinese studies focus on the offer prices in IPOs, we look instead at the prices that are formed in the aftermarket, and in particular, whether earnings management play a role in inflating the stock prices of IPOs. The unique nature of the Chinese data enables us to draw firm conclusions about the stock price response to this type of accounting practice.

In a seminal paper, Teoh et al. (1998b) attribute the long run underperformance of US IPOs to opportunistic timing of IPOs and optimistic investors. However, the more recent empirical picture is mixed, both with respect to the use of earnings management and its effects on prices. Lee and Masulis (2008) find, for instance, evidence of variability in the use of earnings management in IPOs – earnings management is actively discouraged by reputable underwriters. This diversity is further documented by Chen et al. (2010) in a study of Chinese IPOs,[1] where underwriter reputation plays a role in some segments of the market but not in others. Armstrong et al. (2009) argue in contrast that the importance of earnings

[1] The Chen et al. (2010) study looks at Chinese IPOs in the period 2002 – 2008 when underwriters started to become a more active part of the Chinese IPO process. In our sample the role of the underwriter is very limited.

management in IPOs has been overstated and the negative long run returns associated with earnings management around the time of the IPO disappear with closer scrutiny of the data.

The first contribution of our paper is that, due to the unique nature of the data, we are able to add new insights into how the stock market responds to earnings management. The offer price in our sample is regulated by the authorities in that the IPO price is set as a multiple of earnings[2] and so is outside the remit of the underwriter. Given this, there may be an incentive for the issuer to engage in earnings management as inflated earnings will mechanically translate into a higher offer price through application of the earnings multiple. Primary market investors have no influence on the offer price even if they see through the earnings management. However, they still massively oversubscribe for such issues, as in our sample, and this is prima facie evidence that they fail to recognize earnings management. As a consequence, the stock market effects are likely to be relatively more important both for the underpricing and the long run returns of IPO firms.

Our aim is to test the hypothesis that earnings management, that temporarily boosts earnings around the IPO, causes short term price effects in the aftermarket which gradually are eroded over time. We assume as in Teoh at al. (1998b) that investors may not immediately understand accruals information fully. Then the

[2] Chan et al. (2004) argue that the pricing of Chinese IPO was managed by the authorities from 1993 to 1998. The IPO price was set around 15 times of the earnings per share and in the range of 13–16. Kao et al. (2009) report that the P/E ratios applied in the IPO pricing regulations hovered around 15 from 1996 to 1999, with little variation across firms or over time. The choice of P/E multiple is significantly lower than the market average of 30 at that time.

mechanical offer price setting mechanism for our sample IPOs generates a threshold above which we can measure the degree to which investors overreact by taking accounting accruals at face value. Earnings management that generates additional earnings of one dollar has a predictable effect of approximately $15 on the offer price. If the investors in the aftermarket boost the market price by a factor greater than 15 times the earnings increase, the IPO will be more underpriced than similar IPOs with no earnings management. The unique nature of the IPOs in our sample enables us, therefore, to isolate the stock market impact of earnings management. While the use of positive accruals is widely documented as boosting reported earnings and increasing the offer price around equity offerings[3], few studies except apart from Kim and Park (2005) consider the case where the initial trading price can also be affected.

The paper's second contribution is that it develops a parsimonious pricing model in which the short and long term testable implications of this overreaction hypothesis are derived. The short term implication is that underpricing and the extent of earnings management are positively correlated. In contrast, if rational investors are able to see through managed accruals, earnings management would affect the offer price but not the stock price in the immediate aftermarket, implying a negative relation between underpricing and earnings management. The overreaction hypothesis has two long run implications. We expect a negative relation between the long run performance and the use of earnings management. As the accrual effects

[3] See, for example, Teoh et al. (1998a, 1998b), and Rangan (1998) among others.

are reversed in the long run, the biased market belief tends to correct itself and prices decline. A separate issue is whether earnings management is an important factor in determining IPO underpricing and long run returns of IPO companies generally. The model predicts a negative relationship between long-run stock performance and the extent of underpricing, independently of whether the IPO firms engage in earnings management. A general negative relationship suggests earnings management is likely to be a factor that can explain some of the anomalies we observe in the Chinese IPO market.

Consistent with the general findings in the literature, our empirical results show that the extent of underpricing is phenomenal, long-term stock performance is poor, and discretionary (current) accruals are positive and significant in economic terms. While underpricing is as high as 129.32%, the long-term stock performance is -14.89% on average. Discretionary accruals and discretionary current accruals are 6.44% and 14.65% of total assets, respectively. Relating the accruals variables to stock market performance, we find a positive short run relation between underpricing and discretionary (current) accruals consistent with the overreaction hypothesis. We find a negative relation between long term stock performance and discretionary accruals. This result is consistent with the findings of Chaney and Lewis (1998) for a US sample of 489 firms. Finally, we establish a significant inverse relationship between the short run initial returns of IPOs and long run performance, supporting the notion that earnings management may be a factor explaining some of the Chinese IPO anomalies. Both the short and long term empirical results are robust to a variety of test specifications.

The idea that investors are inclined to overprice IPOs is not new. Purnanandam and Swaminathan (2004) find the pricing ratios of US IPO offer prices tend to exceed comparable benchmarks, but then underwriters play a much more active role in the US market. Our study looks instead at a sample where the offer prices are in effect mechanically set, and this enables us to identify earnings management as an important source of IPO overpricing also in the aftermarket. A recent study by Coakley et al. (2010) attributes underpricing and subsequent underperformance to demand. IPO undepricing is driven by high initial investor demand, some of which spills over into the immediate aftermarket to cause price bubbles which subsequently fade in the long run. Earnings management may be a factor driving such demand.

Our findings can be related to several important studies in the literature. Ritter (1991) is the first to study the long-term stock performance of IPOs. He finds that there is a tendency for firms with high adjusted initial returns to have the worst aftermarket performance. No explanation is provided for this relation which he himself acknowledges as an unresolved issue. We complement Ritter (1991) by providing a behavioural explanation for this relation. Teoh et al. (1998b) is the first study among others which reports a negative relation between the long term performance and the discretionary components of accruals. Their interpretation is that investors do not fully understand the information contained in accruals due to their initial over-optimism about the growth prospects of new issues. We find similar evidence for China as Teoh et al. (1998b) do for the US IPO market. We notice that they include IPO underpricing as one of the controls but its coefficient is insignificant. This may be explained by the fact that US investors are more sophisticated than their Chinese counterparts, but may of course also be due to underwriters being more active in predicting investor overreaction in the secondary market when setting offer prices.

The paper is thus organized. Section 2 outlines our model with three predictions. Section 3 describes our data and variable definitions Section 4 presents empirical results. A final section concludes.

2. The Investor Overreaction Hypothesis

In this section, we develop a parsimonious pricing model from which three investor overreaction predictions can be derived. The pricing model incorporates elements of underpricing, earnings management, investor overreaction and long run performance. We explain two important features – earnings management and investor overreaction – before introducing the model.

2.1 Earnings Management

Earnings management seems to be the norm rather than the exception for listed firms. Several studies report evidence of positive accruals around equity offerings (Aharony et al. (1993), Teoh et al. (1998b), Teoh et al. (1998c), Aharony et al. (2000), Ducharme et al. (2001), Roosenboom (2003), and Yu et al. (2003) among others). It is clear that the use of positive accruals can increase the offer price. It is less clear but more interesting to whether the initial market price is also systematically affected in these circumstances. Kahneman et al. (1982) argue that investors subject to cognitive biases often predict future uncertain events by taking a short history of data. When such investors form incorrect beliefs about unusual positive accruals, it is possible that the market price departs from fundamentals over a period. On the theory side, Barberis et al. (1998) develop a model of investor sentiment showing that investors subject to the representativeness heuristic overreact to earnings announcements. On the empirical side, the evidence seems to suggest that the market in general tends to overprice total accruals (Sloan 1996) or more precisely abnormal accruals (Subramanyam 1996, Xie 2001), and this is also true for IPO and SEO stocks (Teoh et al. 1998a, 1998b, 1998c).

2.2 Investor Overreaction

Due to the influence of cognitive biases, investors may not fully understand managed accruals. This failure may be caused by biased beliefs about pricing on the part of the representative investors as in the Barberis et al. (1998) or Daniel et al. (1998) models, or could alternatively be due to the presence of naïve investors such as in Hong and Stein (1999). While we remain agnostic about why investors fail to understand accruals, we refer to the failure of investors, in particular those in the secondary market, fully to account for the impact of earnings management when pricing new issues as the overreaction hypothesis.

The unique Chinese context implies that earnings management has an impact on stock prices in the immediate aftermarket that can be measured. China is in the midst of transforming itself from a centrally planned towards a market economy. Thus many economic and monetary policies are subject to strict regulation, and the pricing of new issues is no exception. When the average market P/E ratio was as high as 30 in the 1990s, the multiple used for pricing new issues was set far below this, normally in the range between 13-18 depending on the industry in which firms operated. This severely circumscribes the price discovery role of both the underwriter and the issuer. The impact of managed accruals in the primary market is institutionally restricted by the (often fixed) offer price, but this of course does not apply to the secondary market. This difference is systematic and important and contrasts with the situation in other countries where investors typically can overreact to managed accruals in both the primary and secondary markets.

2.3 Model and Predictions

We outline a parsimonious pricing model from which short and long term predictions can be derived. There are three prices of interest – the offer price p_0, the first trading day closing price p_1, and the long run market price after 3 years p_2, which is assumed to be the fundamental value. We define

$$p_0 = p_2(1-u)(1+a_1 x) \quad (1)$$

$$p_1 = p_2(1+a_2 x) \quad (2)$$

where u is the degree of underpricing relative to the fundamental value and u<1; x is the extent of earnings management and x>0; a_1 captures the mechanical price setting effect of earnings management, and a_2 is overreaction coefficient in the aftermarket. Given the record levels of underpricing in Chinese IPOs, we assume $0<a_1<a_2$ or that the overreaction effect dominates the first-day closing price .

$$IR = \frac{p_1}{p_0} - 1 = \frac{(1+a_2 x)}{(1-u)(1+a_1 x)} - 1 \tag{3}$$

$$BHR = \frac{p_2}{p_1} - 1 = \frac{1}{(1+a_2 x)} - 1 \tag{4}$$

Differentiating *IR* and *BHR* with respect to *x*, we have:

$$\frac{dIR}{dx} = \frac{a_2 - a_1}{(1-u)(1+a_1 x)^2} > 0 \tag{5}$$

$$\frac{dBHR}{dx} = -\frac{a_2}{(1+a_2 x)^2} < 0 \tag{6}$$

Since $u<1$ and $0<a_1<a_2$, the first order derivative of *IR* with respect to *x* is positive. This yields the first prediction of a positive relation between the initial return or the observed "underpricing" and accruals or the use of earnings management. Because the overreaction coefficient is positive, the derivative of *BHR* with respect to *x* is negative. Thus our second prediction is that there is a negative relation between long-term stock performance and the use of earnings management.

To derive the predicted relation between *BHR* and *IR*, we use the chain rule to find the first-order derivative since *IR* is a function of *x*.

$$\frac{dBHR}{dIR} = \frac{dBHR}{dx}\frac{dx}{dIR} = -\frac{a_2(1-u)(1+a_1 x)^2}{(1+a_2 x)^2(a_2 - a_1)} < 0 \tag{7}$$

Because $0<a_1<a_2$ and $u<1$, its sign is negative. This yields our third prediction of an inverse relation between the long-term stock performance and initial return.

Note that we separate the earnings management effect on the offer price from the genuine extent of underpricing, so the overreaction hypothesis is independent of models of underpricing. We do not specifically restrict *u*>0 which is consistent with the underpricing of IPO offer prices. Thus we can obtain these three predictions not only when new issues are genuinely underpriced but also overpriced relative to the fundamentals. However, we are unable to conclude whether new issues are underpriced or overpriced relative to fundamentals unless the genuine extent of earnings management, which is unobservable, becomes known. New issues are truly underpriced in the primary market when $p_0 < p_2$, or $a_1 x < u/(1-u)$, and overpriced otherwise.

3. Data

3.1 Sample and Benchmark Selection

Data on annual reports and trading come from the Centre for Chinese Economic Research (CCER) database and the China Stock Market Accounting Research (CSMAR) database. The starting point of our sample is dictated by accounting standards and in particular by the *Accounting Standard for Business Enterprises: Cash Flow Statements* that became operative from January 1998. Since it is only feasible to calculate accruals using cash flow statements in the first post-IPO year, we use a sample of 506 IPOs issued 1998 to 2003 and listed within the next three years on the Shanghai Stock Exchange (SHSE) or Shenzhen Stock Exchange (SZSE). Companies that operated in the financial industry are excluded from our sample as their financial statements are presented in a different format.

We also gather financial information on 4351 non-IPO benchmark firms that match our sample IPOs firms over the same period to identify the discretionary components in accruals. These benchmark firms are required to have at least two years of history in the stock market. Following the convention, we exclude abnormal non-issuing benchmarks with total accruals or current accruals greater than total assets at the beginning of year in absolute terms.

3.2 Variable Definition

3.2.1 Underpricing

We follow Ritter and Welch (2002) in defining IPO underpricing as the initial return (*IR*) on the first day of trading:

$$IR_{j,1} = \left(\frac{P_{j,1}}{P_{j,0}} - 1 \right) \times 100\% \qquad (8)$$

where $P_{j,0}$ and $P_{j,1}$ are the offer price and the closing price of new issue *j* on the first day of trading. The initial market return (*IMKTRTN*) is analogously defined:

$$IMKRTN_{m,1} = \left(\frac{P_{m,1}}{P_{m,0}} - 1 \right) \times 100\% \qquad (9)$$

where $P_{m,0}$ and $P_{m,1}$ are the market index on the offer date and first trading day, respectively.

3.2.2 Long-run Performance

We consider two measures of long-run stock performance. One is cumulative abnormal returns (*CAR*) from its offer date until the earliest of its delisting date, its third anniversary, and December 31, 2006. The other is buy-and-hold returns (*BHR*) starting four months after the first fiscal year-end to allow for the reporting lag.[4] The former follows the method used by Ritter (1991) and the latter by Teoh et al. (1998b). We use the general market index[5] to adjust stock returns on a monthly basis. Both the calendar-time approach and the event-time approach are used to measure the length of period. The calendar-time approach defines one month as 21 successive trading days except that month 0 only comprises the first day of public trading. Thus the 2-22nd event days make up month 1, the 23-43rd event days make up month 2, and so on.

Monthly abnormal returns are calculated as the monthly raw return on a stock in excess of the monthly market return for the corresponding period. The abnormal return for stock *j* in month *t* is given as:

$$AR_{j,t} = r_{j,t} - r_{m,t} \tag{10}$$

The average abnormal return on a portfolio of *n* stocks for event month *t* is the equally-weighted arithmetic average of the market-adjusted returns:

$$AR_t = \frac{1}{n}\sum_{j=1}^{n} AR_{j,t} \tag{12}$$

The aftermarket performance measure of cumulative abnormal return (*CAR*) from event month *q* to event month *s* is the summation of the average abnormal returns over this period:

$$CAR_{q,s} = \sum_{t=q}^{s} AR_t \tag{13}$$

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4 The Chinese listed companies are required to release their audited annual reports by the end of April next year.

5 SHSE A-share Index and SZSE A-share Composite Index.

As an alternative to the use of *CAR*, we also consider buy and hold returns (*BHR*) with a 3-year holding period:

$$BHR_j = \prod_{t=1}^{36}\left(1 + r_{j,t}\right) \tag{14}$$

3.2.3 Accruals

Following Teoh et al. (1998b) and others, we use the first available financial statements to calculate the accrual variables in this study. We do not use strictly pre-IPO data because there are only a very small number of issuing firms with sufficient information to calculate the variables of interest. However, there is good reason to believe that the incentive to manage earnings is very likely to continue and it is appropriate to use the post IPO accounting data which come to the public domain several months later to estimate the extent of earnings management in the IPO prospectus. Specifically, in those circumstances where realized earnings are in the range of 10-20% less than the corresponding earnings in management forecasts contained in the IPO prospectus, the Chinese Securities Regulatory Committee (CSRC) requires that the listed firms and the relevant auditing institute to explain the difference to the general public in the newspapers. For discrepancies in excess of 20%, the CSRC launches a formal investigation at a later date. The listed firms and the auditing institute who are found deliberately to have misled investors by faulty earnings forecasts face additional tougher penalties.[6]

[6] See the CSRC announcement in year 1996 on several issues regarding stock issuance.

In this study, we emphasize the importance of discretionary current accruals as the key variable representing earnings management. Discretional total accruals are also examined as an alternative. Details of our estimation procedure can be found in the appendix.

3.3 Descriptive Statistics

Table 1 provides descriptive statistics for the 506 IPO firms in our sample.

[Table 1 around here]

The distribution of the sample is reported in Panel A by year and in Panel B by industry. During the 1998-2003 period, our 506 sample IPOs exhibited average (median) underpricing of some 129% (116%). Average underpricing peaks at 152% in 2000 before declining to a low of 74% in 2003. While this level of underpricing is at the lower end of the spectrum of that reported in other studies of Chinese IPOs (see Su and Fleisher (1999) and Chan et al. (2004), for example), it is still huge by comparison with that reported in advanced economies.

IPO activity follows a similar pattern with some 135 issues in 2000 which is more than double that of 61 in 2003. It is not surprising that manufacturing industry new issues dominate the others with 346 IPO firms that account for more than two thirds of the sample. IPO firms from four industries appear the most underpriced in terms of both average and median underpricing: those in the real estate, services, wholesale and retail, and information technology industries. Information on 58 sector specifications is used to find matching benchmarks and to calculate the discretionary and non-discretionary components of accruals in our study.7

Table 2 reports the abnormal returns (*AR*) and cumulative abnormal returns (*CAR*) for the 36 event months after going public for the 506 IPOs in 1998-2003.

[Table 2 around here]

Twenty-one of the 36 monthly-adjusted returns are negative, among which 11 are in the final 12 months. After ups and downs for the first 24 months, the cumulative abnormal returns become poorer and poorer. By contrast, the decline in unadjusted cumulative returns appears to be more dramatic. Twenty-three are positive in the first 24 months and all but one are negative in the final 12 months, with 23 of them having t-statistics significant mainly at the level of 5% or better. By the end of month 36 excluding the initial returns on the first day of trading, the cumulative returns are -7.08% (t = -3.12) and -12.04% (t = -3.96), with and without adjusting for market performance respectively. The underperformance of IPOs is significant in both statistical and economical terms. The extent of underperformance seems similar to other studies on Chinese IPOs, for example a wealth relative ranging from 0.90 to 0.98 reported in Chan et al. (2004)

Figure 1 illustrates this point graphically, with market-index adjusted CARs and the unadjusted CARs plotted over the 36 event months.

[Figure 1 around here]

Up to the 19th event month when they peak at 0.88%, the adjusted CARs moving around zero are small and none is significant. Then they exhibit a steady decline over

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[7] We check the industry specifications of the firms year by year in case firms change their core business from one industry to another in the years after the IPO.

the course of the remaining months. The unadjusted CARs follow a similar pattern but decline more dramatically from a peak of 4.30% in the 16th event month to a nadir of -12.03% in the 36th month. Both adjusted and unadjusted CARs are statistically significant at the 1% level.

Table 3 presents summary statistics on selected variables for the 506 IPOs. Panel A and B provide descriptive statistics on accrual variables and control variables included in the models for underpricing and long-term performance, respectively.

[Table 3 around here]

Panel A reveals two really interesting patterns. First, average discretionary accruals dwarf average non-discretionary accruals in absolute terms. *DA* are five times *NDA*, *DCA* are almost 10 times *NDCA* while *DLA* are more 30 times *NDLA*. Second, average discretionary total accruals and discretionary current accruals are both significantly positive whilst average discretionary long term accruals are significantly negative, all at the 1% critical value. While discretionary accruals are on average 6.44% of total assets at the beginning of the year, discretionary current accruals are more than double that at 14.65% and discretionary long-term accruals are some -8.21% on average. The positive values for both *DA* and *DCA* are consistent with evidence in the literature that issuers use income-increasing accruals to manage earnings. The large negative value of discretionary long term accruals seems to indicate that the IPO firms shift earnings from the future to the present. Thus earnings manipulation around the IPO is short-term oriented at the expense of long-run gains.

Panel B reports data statistics for 308 IPOs used for the long-term analysis. The sample becomes smaller because we can only include those IPOs for which at least 36 months trading records are available. Following Teoh et al. (1998b), we calculate the long-term stock performance measure, the buy-and-hold return (*BHR*), under the calendar-time approach rather than the event-time approach, for the cross sectional analysis. Since all Chinese listed firms are required to release to the public their audited financial statements by the end of the following April, our estimation of the BHR starts from the first of May so that all the accrual information contained in the first financial statement can be known for sure to investors. Panel B shows that while the market return over the subsequent 36 calendar months is -11.01%, the BHR over this three-year period is some -14.89%, even lower than the benchmark by almost 4%. The panel also reports some respects of the change in operating performance over 3-year period. For the first three years, Net incomes and capital expenditure of these newly listed companies do not change much. Although ROA and ATO seem to fall after going public, sales growth and CFOA appear to become stronger marginally.

Panel C reports the details of accrual variables and operating performance measures in each and every financial year. While average *DCA* is positive in the first financial year, it becomes significantly negative in the second and third years. In sharp contrast, *DLA* is negative on average in the first year but turns positive in the second and third years. The relative importance of the two major components of *DA* undergoes a dramatic change: the dominance of the *DCA* component declines after the first year and is overtaken by the *DLA* component in the subsequent years. When compared to the operating performance over three years, *SalesG* does not vary a lot.

The steady decline in *NetIncome*, *ROA*, and *ATO* except for the increase in *CapExp* appears to coincide with the change in *DA*.

4. Empirical Results

4.1 Univariate Results

Table 4 examines the relation between underpricing and earnings management by sorting selected variables into quintiles based on the magnitude of underpricing in Panel A, of discretionary accruals in Panel B, and of discretionary current accruals in Panel C.

[Table 4 around here]

Panel A presents the mean values for each quintile based on the magnitude of underpricing. The discretionary accruals (*DA*) for the most aggressive earnings management firms are associated with the highest quintile of underpricing. The mean *DA* and *DCA* in the lowest underpricing quintile are 4.8% and 12.89%, respectively, compared to 8.9% and 17.93% in the highest quintile. Panel B and C, based on the magnitude of discretionary accruals and discretionary current accruals respectively, share similarities in that the magnitude of underpricing increases in the discretionary components. The mean underpricing in the most conservative quintiles is 122.85% and 120.13%, respectively, whereas the corresponding underpricing in the most aggressive quintiles is 139.5% and 140.24%, respectively. This is a substantial difference of some 17-20 percentage points. Issuers with more aggressive use of discretionary accruals experience deeper underpricing and this relationship is monotonic.[8]

Table 5 examines the relation between the long-term stock performance and earnings management by sorting three-year buy-and-hold returns into quintiles based on their magnitude.

[Table 5 around here]

Panel A presents the mean values for each quintile based on the three-year BHRs. The discretionary components of accruals, *DA*, *DCA* or *DLA*, are not monotonically related to stock performance over three years. However, performance appears to be positively correlated with the contemporaneous three-year buy-and-hold market return (*MKTRTN*) and the change in net income (*ΔNetIncome*), and negatively correlated with initial underpricing (*IR*). Panels B and C, based on the magnitude of discretionary accruals and discretionary current accruals, respectively, provide some insights into the relationship between *BHR*, *DA*, *DCA* and *DLA*. The mean *BHR* in the most conservative quintiles is -7.79% and -18.18%, whereas the corresponding *BHR* in the most aggressive quintiles is -10.34% and -22.14%, respectively. Although this small difference of 3-4 percentage points between the two extremes is not economically significant, we notice that the highest *BHR* in Panel B is from the quintile with the smallest *DA*, *DCA* and *DLA* while the worst *BHR* in Panel C come from the quintile with the largest *DA* and *DCA* and the smallest *DLA*.

[8] The underpricing difference of -13bp between the lowest and 2nd DCA quintiles is statistically insignificant.

4.2 Underpricing

4.2.1 Control Variables

To test the underpricing hypotheses, we first examine whether those variables documented in the literature are determinants of underpricing in the context of our sample. Then we take these as control variables and introduce a set of accrual variables in the following two models.

Model 1:

$$IR = \alpha_0 + \alpha_1 DA + \alpha_2 NDA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u \qquad (15)$$

Model 2:

$$IR = \beta_0 + \beta_1 DCA + \beta_2 NDCA + \beta_3 DLA + \beta_4 NDLA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u \qquad (16)$$

where *IR* is initial returns, defined as the percentage difference between the offer price and the closing price on the first trading day , the accrual variables (scaled by total assets at the beginning of year) are as defined in the previous section, and CtrlV is a set of control variables.

Few established theories can rationalize the severe underpricing of Chinese IPOs. Thus we focus on existing empirical studies and seek to find the relevant determinants of underpricing employed in these. We include the time lag between offering and listing, issue size, allocation rates, and the contemporaneous market return for this purpose. First, the time lag between offering and listing is a relevant factor in explaining underpricing in prior studies such as those of Mok and Hui (1998), Su and Fleisher (1999), and Chan et al. (2004). Issuers in Chinese IPOs normally spend months waiting for approval from the CSRC. The logic is that the longer the time lag, the more valuation uncertainty involved thus the greater underpricing is required as compensation on average.[9] Second, extant studies document that underpricing is related to issue size or funds raised (Su and Fleisher 1999, Chan et al. 2004, Chi and Padgett 2005). This positive relationship can be justified by valuation uncertainty and information asymmetry proposed by Baron (1982), Rock (1986) and Ritter and Welch (2002) among others. Investors taking increased valuation risks for larger firms will be compensated in the form of underpricing.

Third, another salient feature documented in the literature is the overwhelming excess demand for new issues in China (Chi and Padgett 2005, Coakley et al. 2010). Underpricing of IPOs reported in these two studies is negatively related to the rate of allocation as predicted by some classical model such as Rock (1986) and Welch (1992) in which underpricing is used as a positive signal to attract excess investor demand. Finally, we also consider the market return in the period between offering and listing as a potential determinant of IPO underpricing. Chan et al. (2004) find that the underpricing of Chinese IPOs is positively related to the return on the corresponding stock market index between offering and listing.

4.2.2 Regression Results

[9] However, Shen (2007) further examines this relation and find that this relationship is primarily driven by the inclusion of IPOs issued in the early 1990s where exceptionally high levels of underpricing with extreme time lags were common. When these early issues are excluded, the positive relation between the time lag and underpricing breaks down and no longer holds.

Table 6 presents the results of regressing IPO underpricing on proxies for earnings management and control variables. The *t*-values are calculated using White's (1980) robust standard errors.

[Table 6 around here]

In Model 0, the non-accrual determinants of IPO underpricing are examined. We find that only the coefficients on *PROCEEDS* and *IMKTRTN* are statistically significant for both sample groups.[10] Thus we incorporate these two variables in the two underpricing models testing for the presence of investor overreaction.

In Model 1 with discretionary total accruals (*DA*) as a proxy for earnings management, we find a significantly positive relationship between *DA* and IPO underpricing. In Model 2 after distinguishing the current and long term components in *DA* and non-discretionary total accruals (*NDA*), there is a significantly positive relationship between both discretionary current accruals (*DCA*) and discretionary long-term accruals (*DLA*) and underpricing. This positive relationship between the discretionary components in accruals and underpricing is consistent with the overreaction hypothesis. This holds that investors subject to cognitive bias(es) do not fully or correctly interpret discretionary accruals such that the initial pricing error on the part of secondary market investors or the observed level of underpricing tends to increase in the use of earnings management. This positive relation obtains not only in the sample of 506 IPOs with the 13 SIC (standard industry classification)

[10] The first group of 506 IPOs is obtained when we use industry information to generate the coefficient of the modified Jones model while the second group of 337 IPOs is smaller in sample size since we use sector information to proceed. There are no appropriate non-IPO benchmarks for some particular sectors so we end up with a smaller group.

codes but also in a smaller sample of 337 IPOs when we use the 91 sector specifications.

Overreaction to some particular type of information may not be the only aspect about which investors are less than fully rational. The latter also includes a particular type of sentiment called “errors around the mean” described by Stein (1996, p. 431) as “systematic errors in forming expectations so that stocks can become significantly over- or undervalued at particular points in time.” Loughran and Ritter (1995) argue that firms take advantage of windows of opportunity by issuing stock when equities are substantially overvalued. Baker and Wurgler (2002) propose that managers tend to exploit temporary fluctuations in investor sentiment, issuing equity when market valuations are high and repurchasing shares otherwise. Successful market timing enables issuers to sell their IPOs at higher prices, closing the gap between the offer price and the market price. This particular argument does not apply to the Chinese IPOs studied here, as there is more incentive for managers to take advantage of “windows of opportunity” to maximize the IPO offer price (which is linked to earnings) rather than the market price in the secondary market.

4.3 Long-Term Performance

4.3.1 Control Variables

Teoh et al.’s (1998b) study of the US market reports that the accruals variables in the regression model exhibit satisfactory explanatory power for post-issue long term performance with the following control variables: *MKTRTN*, a contemporaneous three-year market return from the exchange that listed the IPO; *PROCEEDS*, the natural logarithm of the issue size in monetary units; *ΔCapExp*, the asset scaled change in capital expenditure; *ΔNetIncome*, the asset scaled change in net income; and *IR*, the underpricing variable. Chan et al. (2004) study the stock performance of Chinese IPOs for the three post-issue years and find that the changes in several operating performance proxies around the offerings can be used to explain the long-term performance of IPOs. These operating performance variables include *ΔROA*, the change in operating profits on assets, *ΔCFOA*, the change in operating cash flows on assets, *ΔSalesG*, the change in sales growth, *ΔCapExp*, the change in capital expenditure, and *ΔATO*, is the change in asset turnover. All such variables are scaled by the total assets at the beginning of year.

We consider all these potential control variables (*CtrlV*) for inclusion in our regression model alongside the accrual variables.

Model 3:

$$BHR = \alpha_0 + \alpha_1 DA + \alpha_2 NDA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u \tag{17}$$

Model 4:

$$BHR = \beta_0 + \beta_1 DCA + \beta_2 NDCA + \beta_3 DLA + \beta_4 NDLA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u \tag{18}$$

where *BHR* is the three-year post-issue buy-and-hold return calculated starting four months after the first fiscal year-end.

4.3.2 Regression Results

Table 7 presents the results for regressions of long-term performance on proxies for earnings management and control variables. The *t*-values are calculated using White's (1980) robust standard errors.

[Table 7 around here]

We use *DA* in Model 3 to proxy for earnings management while we further distinguish between the current and long term components of *DA* and non-discretionary total accruals (*NDA*) and use *DCA* in Model 4 to proxy for the use of earnings management. We find an inverse relation between *BHR* and *IR* which is significant at the 1% level in both models, whether or not holding constant managed accruals.[11] Consistent with our overreaction hypothesis, this evidence suggests that the decline in stock performance over time is related to biased market beliefs about managed accruals on the part of investors in the secondary market. When additional information becomes available to investors, little by little they become aware of two respects. One is that new issues are not as good as they appear to be. This can be supported by the negative relation between *BHR* and *DCA* and *DLA*, holding constant underpricing. This is a case in point where short-termist earnings management is bad for long run wealth! The other aspect is that investors in the secondary market pay too much for shares and the long run reversal of prices is increasing in this initial pricing error. The results confirm a significant negative relation between *BHR* and underpricing.

Finally, we find a significantly negative relation between discretionary accruals and *BHR* in both models. This is consistent with the findings from other

[11] In the unreported regression which does not include any accrual variable, the coefficient on *IR* is negative (-0.12) with a *t*-value of -4.19.

studies such as Subramanyam (1996), Teoh et al. (1998a), Teoh et al. (1998b), Xie (2001) among others. The generally accepted interpretation is that that the market tends to overprice discretionary accruals and the discretionary components of accruals are good predictors of long term performance.

4.4 Robustness Checks

This subsection reports on aspects that could potentially affect the validity of our findings: the choice of benchmarks, of proxies for earnings management, of accrual models, and of robust standard errors when calculating *t*-values. Our results do not change qualitatively when we use the Fama-French 12-industry classification instead of the Chinese standard industry codes and when we consider operating income as an alternative to earnings.[12]

4.4.1 Jones (1991) Model

The main analysis relies on the modified Jones model (Dechow et al. 1995) to identify accrual components. Here we use the original Jones (1991) model to see if the results are robust to this alternative model specification. The difference between the original and modified Jones model lies in the estimation of the non-discretionary component. The latter subtracts the changes in accounts receivable (*ARec*) from the changes in sales while the former does not. Advocates contend that this modification is to accommodate sales manipulation in many scenarios, for example, when credit policies are relaxed to achieve high sales prior to the offering. Tables 11 and Table 12

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

present regression results for the underpricing and long-term performance models respectively using the original Jones model (1991). The *t*-values are calculated using White's (1980) robust standard errors.

[Tables 8 and 9 around here]

We find that the main results do not change qualitatively. The positive relation between underpricing and the discretionary accrual components remains significant at the 5% level and the negative relation between three-year *BHR* and discretionary accrual components becomes more significant, at the 1% level. Our results are robust to the choice of accrual model.

4.4.2 Newey-West Standard Errors

We use White's (1980) robust standard errors to calculate *t*-values throughout the paper. In addition to heteroskedasticity, the results might be affected by the presence of serial correlation. We examine this issue by using Newey-West (Newey and West 1987) heteroskedastic and autocorrelation (HAC) consistent standard errors which adjust for both problems in Tables 10 and 11.

[Tables 10 and 11 around here]

The results for the underpricing and underperformance models respectively suggest that our findings are not affected by this alternative robust standard error. Both the positive relation between discretionary accruals and IPO underpricing, and the negative relation between discretionary accruals and long term stock performance remain significant.

6. Conclusions

We develop a parsimonious pricing model incorporating the overreaction hypothesis and empirically test its predictions for a sample of 506 IPOs in China issued during the 1998-2003 period. The offer price is set as a multiple of earnings by the authorities and so earnings management mechanically inflates the offer price in this unique framework. This generates a threshold above which we can measure the degree to which secondary market investors overreact by taking accounting accruals at face value. We find that discretionary current accruals boost reported earnings around Chinese IPOs by almost 15%. The empirical results offer support for the three predictions of the overreaction hypothesis.

First, they show that the initial underpricing of IPOs and discretionary accruals are positively related. Second, the regression results indicate a negative relationship between the three-year buy-and-hold return and discretionary accruals. This is similar to the findings of the seminal study of Teoh et al. (1998b). The accounting accrual effects are reversed in the long run, thus leading to a flow of bad news for the firms with a larger component of accruals in reported earnings at the IPO stage. Finally, the results also show an inverse relationship between the three-year buy-and-hold return and underpricing. Investors in the secondary market seem to overreact to managed accruals by buying shares at prices up to the first-day closing price. These findings suggest that the use of earnings management is an important factor generating a pattern where the stock prices of IPO firms tend to be inflated by overreaction in the secondary market but subsequently adjust towards their fundamental levels.

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Table 1: Sample IPO Characteristics

The sample consists of 506 domestic IPO firms going public in the period from 1998 to 2003. Panel A Panel B report the distribution by year and by industry respectively.

Panel A: Time Distribution

Year	Freq.	Underpricing	Min	Median	Max	St. Dev.
1998	78	131.83%	2.08%	119.83%	429.48%	83.13%
1999	88	119.14%	7.14%	103.81%	830.21%	110.10%
2000	135	151.97%	0.28%	141.35%	476.77%	86.60%
2001	76	138.08%	0.74%	126.75%	413.79%	88.35%
2002	68	133.54%	27.77%	116.96%	428.25%	80.92%
2003	61	74.32%	-31.45%	71.86%	227.99%	44.66%
Total	506	129.23%	-31.45%	116.31%	830.21%	89.07%

Panel B: Industry Distribution

Codes	Freq.	Underpricing	Min	Median	Max	Std. Dev.	Specifications
A	9	73.23%	3.23%	71.03%	125.87%	47.86%	Mining
B	5	154.11%	95.68%	176.87%	185.56%	38.58%	Real Estate
C	346	126.57%	0.28%	112.21%	468.27%	83.19%	Manufacturing
D	18	149.83%	41.82%	149.89%	344.70%	72.65%	Agriculture
E	22	121.20%	34.61%	119.75%	198.10%	52.28%	Utilities
F	11	88.50%	21.31%	86.30%	176.45%	52.79%	Construction
G	32	81.74%	-31.45%	73.58%	246.44%	55.87%	Transportation
H	24	171.20%	16.43%	143.56%	476.77%	115.37%	Information Technology
I	19	174.42%	41.38%	173.28%	404.17%	77.22%	Wholesales and Retails
J	0						Finance
K	11	178.30%	7.14%	171.45%	452.77%	122.62%	Services
L	0						Media
M	9	200.98%	44.29%	124.18%	830.21%	231.88%	Conglomerate
Total	506	129.23%	-31.45%	116.31%	830.21%	89.07%	

Table 2: Cumulative Abnormal Returns for IPOs in 1998-2003

This table presents abnormal returns (*AR*) and cumulative abnormal returns (*CAR*) up to 36 months for 506 IPOs issued in the 1998-2003. We also include cumulative returns (*CR*) with no adjustment for market performance.

Month	Number	AR_t (%)	*t*-stat	$CAR_{1,t}$ (%)	*t*-stat	$CR_{1,t}$ (%)	*t*-stat
1	506	-0.9786	**-2.27**	-0.9768	**-2.79**	-0.4970	-1.06
2	506	0.7437	**1.86**	-0.2331	-0.47	0.9536	1.44
3	506	0.2577	0.66	0.0246	0.04	1.7058	**2.10**
4	506	0.3726	1.07	0.3972	0.57	2.6412	**2.81**
5	506	0.2998	0.79	0.6970	0.89	3.3728	**3.21**
6	505	0.0877	0.25	0.7847	0.91	4.0678	**3.53**
7	505	-0.3886	-1.27	0.3961	0.43	3.2152	**2.58**
8	505	-0.8894	-2.58	-0.4933	-0.50	2.4991	**1.88**
9	505	-0.4770	-1.50	-0.9703	-0.92	2.3634	1.67
10	505	0.1775	0.54	-0.7928	-0.71	2.6063	1.75
11	505	0.3943	1.13	-0.3985	-0.34	3.0478	**1.95**
12	505	0.0865	0.22	-0.3120	-0.26	3.1781	**1.95**
13	505	0.0321	0.09	-0.2799	-0.22	3.5660	**2.10**
14	505	0.7970	**2.18**	0.5172	0.39	4.2287	**2.40**
15	505	0.0320	0.10	0.5492	0.40	4.1672	**2.29**
16	505	-0.3005	-0.87	0.2487	0.18	4.2984	**2.28**
17	505	-0.0348	-0.10	0.2139	0.15	4.2133	**2.17**
18	505	0.5621	1.71	0.7760	0.52	4.1762	**2.09**
19	505	0.1086	0.27	0.8847	0.58	3.9841	**1.94**
20	505	-0.6813	**-2.08**	0.2034	0.13	3.2462	1.54
21	505	-0.2656	-0.75	-0.0622	-0.04	2.3161	1.07
22	505	0.1231	0.36	0.0608	0.04	2.0583	0.93
23	505	-0.2256	-0.70	-0.1647	-0.10	2.1503	0.95
24	502	-0.1815	-0.55	-0.3462	-0.20	1.8800	0.81
25	496	-0.2818	-0.89	-0.6280	-0.35	0.8908	0.38
26	492	-0.4756	-1.33	-1.1036	-0.61	-0.5956	-0.24
27	483	-0.6179	-1.75	-1.7215	-0.92	-2.3592	-0.94
28	474	-0.1915	-0.58	-1.9130	-1.00	-3.3945	-1.32
29	467	-0.5593	-1.61	-2.4723	-1.26	-4.3898	-1.67
30	461	-1.1776	**-3.48**	-3.6499	**-1.81**	-6.4109	**-2.38**
31	459	-1.1054	**-3.40**	-4.7553	**-2.32**	-8.0975	**-2.95**
32	452	-1.3594	**-3.34**	-6.1147	**-2.91**	-10.0726	**-3.58**
33	446	-0.1855	-0.47	-6.3002	**-2.94**	-10.2677	**-3.57**
34	444	-0.2916	-0.85	-6.5918	**-3.02**	-10.8126	**-3.69**
35	441	-0.4948	-1.25	-7.0866	**-3.19**	-11.3670	**-3.81**
36	435	0.0113	0.03	-7.0753	**-3.12**	-12.0356	**-3.96**

The abnormal returns (AR_t) and cumulative abnormal returns ($CAR_{1,t}$) in percentage, with associated *t*-statistics for the 36 months after going public, excluding the initial return on the first day of trading. $AR_t = \frac{1}{n_t}\sum_{i=1}^{n_t}\left(r_{i,t} - r_{m,t}\right)$, where $r_{i,t}$ is the total return on initial public offering firm i in event month t and $r_{m,t}$ is the total return on the corresponding market index. The *t*-statistics for abnormal returns is computed for each month as $\frac{AR_t \cdot \sqrt{n_t}}{sd_t}$, where AR_t is the abnormal return for month *t*, n_t is the number of observations in month *t*, the cross-sectional standard deviations vary from a low of 6.88 percent in month 7 to a high of 9.69 in month 1. The *t*-statistics for the cumulative abnormal returns in month *t*, $CAR_{1,t}$, is computed as $\frac{CAR_{1,t} \cdot \sqrt{n_t}}{csd_t}$, where n_t is the number of firms trading in each month, and csd_t is computed as $csd_t = \sqrt{t \cdot \mathrm{var} + 2 \cdot (t-1) \cdot \mathrm{cov}}$, where *t* is the event month, var is the average (over 36 months) cross-sectional variance, and cov is the first-order autocovariance of the AR_t series.

Table 3: Descriptive Statistics on Selected Variables

Panel A and Panel B provide descriptive statistics for selected variables used in the underpricing and underperformance model respectively. Panel C provides descriptive statistics on some selected variable over three years after going public. *IR* is the initial return; *PROCEEDS* is the natural logarithm of the issuing size in monetary units; *DA* is discretionary total accruals scaled by total assets at the beginning of year; *NDA* is non-discretionary total accruals estimated from the fitted coefficients generated from benchmarks; *DCA* is discretionary current accruals scaled by total assets at the beginning of year; *NDCA* is non-discretionary current accruals estimated from the fitted coefficients generated from benchmarks; *DLA* is discretionary long term accruals scaled by total assets at the beginning of year; *NDLA* is non-discretionary long term accruals estimated from the fitted coefficients generated from benchmarks; *MKTRTN* is the contemporaneous three-year buy-and-hold market returns; Δ *NetIncome* is the asset-scaled change in net income; Δ*ROA* is the change in operating profits on assets; Δ*CFOA* is the change in operating cash flows on assets; Δ*SalesG* is the change in sales growth; Δ*CapExp* is the change in capital expenditure scaled by lagged total assets; Δ*ATO* is the change in asset turnover.

Panel A: Variables for Underpricing (506 IPOs)

Variable	Mean	(*t*-value)	Median	Minimum	Maximum	Std. Dev.
IR	129.23%	(32.64)***	116.31%	-31.45%	830.21%	89.07%
DA	0.0644	(8.10)***	0.0554	-1.6718	0.7256	0.1787
NDA	-0.0128	(-5.31)***	-0.0062	-0.5418	0.1648	0.0542
DCA	0.1465	(11.16)***	0.1162	-1.6137	1.9274	0.2953
NDCA	-0.0154	(-8.27)***	-0.0126	-0.4241	0.2099	0.0420
DLA	-0.0821	(-6.80)***	-0.0564	-1.8456	1.4328	0.2717
NDLA	0.0026	(1.14)	0.0069	-0.3022	0.2332	0.0520
PROCEEDS	8.6166	(671.93)***	8.8513	7.8405	10.0725	0.2885
IMKTRTN	0.91%	(2.65)***	0.58%	-19.32%	48.51%	7.74%

Panel B: Variables for Underperformance (380 IPOs)

Variable	Mean	(*t*-value)	Median	Minimum	Maximum	Std. Dev.
BHR	-14.89%	(-5.12)***	-34.39%	-82.48%	250.87%	56.63%
DA	0.0738	(8.32)***	0.0595	-1.4233	0.7256	0.1730
NDA	-0.0027	(-1.20)	-0.0006	-0.1610	0.1648	0.0433
DCA	0.1749	(11.53)***	0.1387	-1.3252	1.9274	0.2956
NDCA	-0.0127	(-6.16)***	-0.0111	-0.2232	0.2097	0.0402
DLA	-0.1010	(-6.96)***	-0.0776	-1.8456	1.4328	0.2830
NDLA	0.0100	(4.23)***	0.0116	-0.2442	0.2332	0.0463
PROCEEDS	8.6312	(592.33)***	8.6018	7.8405	10.0725	0.2841
MKTRTN	-11.01%	(-7.11)***	-24.43%	-43.50%	46.64%	30.21%
IR	138.85%	(29.04)***	122.94%	-5.46%	820.50%	91.85%
Δ*NetIncome*	-0.0024	(-0.74)	-0.0009	-0.6401	0.1694	0.0618
Δ*ROA*	-0.0719	(-18.42)***	-0.0544	-0.5238	0.1048	0.0761

ΔCFOA	0.0175	(1.78)*	0.0092	-1.7123	0.7180	0.1926
ΔSalesG	0.4716	(9.37)***	0.2945	-0.7097	13.0123	0.9813
ΔCapExp	-0.0003	(-0.06)	0.0061	-0.4070	0.5377	0.1012
ΔATO	-0.0699	(-5.02)***	-0.0625	-2.2105	1.1877	0.2715
IR	138.13%	(28.88)***	125.05%	0.28%	830.21%	93.23%

Panel C: Changes in discretionary variables and operating performance variables over three subsequent years

Variable	T=1 (506 IPOs)		T=2 (448 IPOs)		T=3 (380 IPOs)	
	Mean	Median	Mean	Median	Mean	Median
DA	0.0644	0.0554	0.0310	0.0268	0.0103	0.0134
	(8.10)***	(6.97)***	(6.94)***	(6.00)***	(2.29)**	(2.97)***
DCA	0.1465	0.1162	-0.0327	-0.0361	-0.0292	-0.0282
	(11.16)***	(8.85)***	(-3.15)***	(-3.48)***	(-3.57)***	(-3.45)***
DLA	-0.0821	-0.0564	0.0637	0.0641	0.0395	0.0381
	(-6.80)***	(-4.67)***	(5.68)***	(5.71)***	(4.86)***	(4.69)***
NetIncome	0.1116	0.0947	0.0595	0.0556	0.0465	0.0456
	(35.68)***	(30.26)***	(28.39)***	(26.52)***	(17.25)***	(16.93)***
ROA	0.1273	0.1111	0.0653	0.0589	0.0544	0.0525
	(34.71)***	(30.31)***	(26.49)***	(23.90)***	(17.93)***	(17.31)***
CFOA	0.0601	0.0649	0.0469	0.0434	0.0615	0.0608
	(7.17)***	(7.73)***	(9.94)***	(9.21)***	(13.13)***	(12.99)***
SalesG	0.2042	0.1294	0.2217	0.1660	0.2497	0.1821
	(12.26)***	(7.77)***	(12.21)***	(9.14)***	(10.80)***	(7.88)***
CapExp	0.1903	0.1082	0.1237	0.0855	0.0986	0.0785
	(18.40)***	(10.46)***	(22.27)***	(15.40)***	(23.10)***	(18.40)***
ATO	0.6739	0.5639	0.5644	0.4586	0.5855	0.4770
	(34.02)***	(28.46)***	(29.52)***	(23.99)***	(30.62)***	(24.95)***

* Significance at the 10% level

** Significance at the 5% level

*** Significance at the 1% level

Table 4: Univariate Analysis for Underpricing

This table provides some results of univariate analysis for underpricing. *IR* is the initial return; *PROCEEDS* is the natural logarithm of the issuing size in monetary units; *DA* is discretionary total accruals scaled by total assets at the beginning of year; *DCA* is discretionary current accruals scaled by total assets at the beginning of year; *IMKTRTN* is the contemporaneous market returns between offering and listing.

Panel A: Quintiles based on IPO underpricing

Quintiles	Obs.	*DA*	*DCA*	*PROCEEDS*	*IMKTRTN*
Lowest	101	0.0480	0.1289	8.9012	-1.83%
2	101	0.0371	0.1040	8.6731	0.02%
3	102	0.0851	0.1815	8.5556	1.39%
4	101	0.0630	0.1391	8.4973	1.75%
Highest	101	0.0890	0.1793	8.4564	3.23%
Total	506	0.0645	0.1466	8.6166	0.91%

Panel B: Quintiles based on discretionary accruals

Quintiles	Obs.	*DCA*	*IR*	*PROCEEDS*	*IMKTRTN*
Lowest	101	0.0042	122.85%	8.6296	0.94%
2	101	0.0809	127.75%	8.6450	0.74%
3	102	0.1533	129.42%	8.6318	0.32%
4	101	0.1567	126.62%	8.5712	0.38%
Highest	101	0.3380	139.50%	8.6152	2.18%
Total	506	0.1466	129.23%	8.6166	0.91%

Panel C: Quintiles based on discretionary current accruals

Quintiles	Obs.	*DA*	*IR*	*PROCEEDS*	*IMKTRTN*
Lowest	101	-0.0350	120.13%	8.6126	0.06%
2	101	0.0390	120.00%	8.6562	0.34%
3	102	0.0432	132.07%	8.6096	1.10%
4	101	0.0905	133.69%	8.6074	1.26%
Highest	101	0.1849	140.24%	8.5972	1.78%
Total	506	0.0645	129.23%	8.6166	0.91%

Table 5: Univariate Analysis for Underperformance

This table provides some results of univariate analysis for underperformance. *BHR* is three-year buy-and-hold market returns; IR is the initial return; *DA* is discretionary total accruals scaled by total assets at the beginning of year; *DCA* is discretionary current accruals scaled by total assets at the beginning of year; *DLA* is discretionary long term accruals scaled by total assets at the beginning of year; *MKTRTN* is the contemporaneous three-year buy-and-hold market returns; *ΔNetIncome* is the asset-scaled change in net income;

Panel A: Quintiles based on three-year buy-and-hold returns

Quintiles	Obs.	*DA*	*DCA*	*DLA*	*IR*	*ΔNetIncome*	*MKTRTN*
Lowest	76	0.0897	0.1961	-0.1064	186.15%	-0.0416	-0.2933
2	76	0.0610	0.1603	-0.0992	166.27%	-0.0007	-0.2794
3	76	0.0838	0.1835	-0.0998	119.08%	0.0026	-0.2502
4	76	0.0488	0.1463	-0.0975	107.51%	0.0108	-0.0409
Highest	76	0.0859	0.1880	-0.1021	111.59%	0.0172	0.3130
Total	380	0.0738	0.1749	-0.1010	138.13%	-0.0024	-0.1101

Panel B: Quintiles based on discretionary accruals

Quintiles	Obs.	*BHR*	*DCA*	*DLA*	*IR*	*ΔNetIncome*	*MKTRTN*
Lowest	76	-0.0779	0.0273	-0.1530	132.78%	0.0083	-0.0831
2	76	-0.1618	0.1173	-0.1130	137.02%	0.0043	-0.1367
3	76	-0.1793	0.1942	-0.1362	133.92%	-0.0057	-0.1689
4	76	-0.2220	0.1767	-0.0494	136.88%	-0.0067	-0.1221
Highest	76	-0.1034	0.3586	-0.0536	150.05%	-0.0120	-0.0399
Total	380	-0.1489	0.1749	-0.1010	138.13%	-0.0024	-0.1101

Panel C: Quintiles based on discretionary current accruals

Quintiles	Obs.	*BHR*	*DA*	*DLA*	*IR*	*ΔNetIncome*	*MKTRTN*
Lowest	76	-0.1818	-0.0281	0.1268	122.79%	-0.0050	-0.1229
2	76	-0.0783	0.0353	0.0012	142.59%	-0.0020	-0.1089
3	76	-0.2654	0.0541	-0.0883	145.88%	-0.0055	-0.1693
4	76	0.0026	0.1076	-0.1411	141.35%	0.0035	-0.0462
Highest	76	-0.2214	0.2003	-0.4036	138.04%	-0.0027	-0.1034
Total	380	-0.1489	0.0738	-0.1010	138.13%	-0.0024	-0.1101

Table 6: IPO Underpricing and Proxies for Earnings Management

This table presents some results of multivariate analysis for underpricing. *IR* is the initial return, defined as the percentage difference between the offer price and the closing price on the first day of trading; *PROCEEDS* is the natural logarithm of the issuing size in monetary units; *TIMELAG* is the time elapsed between offering and listing; *ALLOC* is the rate of allocation in an oversubscribed IPO; *IMKTRTN* is the return on general market index during the period between offering and listing; *DA* is discretionary total accruals scaled by total assets at the beginning of year; *NDA* is non-discretionary total accruals estimated from the fitted coefficients generated from benchmarks; *DCA* is discretionary current accruals scaled by total assets at the beginning of year; *NDCA* is non-discretionary current accruals estimated from the fitted coefficients generated from benchmarks; *DLA* is discretionary long term accruals scaled by total assets at the beginning of year; *NDLA* is non-discretionary long term accruals estimated from the fitted coefficients generated from benchmarks. The following equations are estimated:

$$IR = \gamma_0 + \gamma_1 PROCEEDS + \gamma_2 TIMELAG + \gamma_3 ALLOC + \gamma_4 IMKTRTN$$

$$IR = \alpha_0 + \alpha_1 DA + \alpha_2 NDA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u$$

$$IR = \beta_0 + \beta_1 DCA + \beta_2 NDCA + \beta_3 DLA + \beta_4 NDLA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u$$

	506 IPOs			337 IPOs		
Model	0	1	2	0	1	2
Intercept	1482.12	1420.30	1385.82	1483.06	1422.97	1445.16
	(11.73)***	(9.96)***	(10.81)***	(9.70)***	(7.45)***	(7.60)***
DA		34.65			47.34	
		(2.06)**			(2.39)**	
NDA		95.53			46.16	
		(1.53)			(2.01)**	
DCA			36.46			53.06
			(2.12)**			(2.54)**
NDCA			8.85			64.20
			(0.11)			(2.10)**
DLA			35.47			30.71
			(1.85)*			(1.48)
NDLA			145.98			15.64

			(1.50)			(0.54)
PROCEEDS	-158.78	-150.17	-146.37	-160.83	-152.14	-154.94
	(-10.61)***	(-9.16)***	(-9.89)***	(-8.81)***	(-6.91)***	(-7.07)***
TIMELAG	0.33			0.39		
	(1.06)			(1.01)		
ALLOC	1.22			1.44		
	(1.17)			(1.37)		
IMKTRTN	2.11	2.10	2.12	1.67	1.64	1.61
	(4.63)***	(4.72)***	(4.67)***	(3.69)***	(3.86)***	(3.76)***
Adjusted R^2	0.3058	0.2879	0.2884	0.3253	0.2890	0.2903

* Significance at the 10% level

** Significance at the 5% level

*** Significance at the 1% level

Table 7: BHR and Proxies for Earnings Management

This table presents some results of multivariate analysis for underperformance. *BHR* is the three-year buy-and-hold return; *DA* is discretionary total accruals scaled by total assets at the beginning of year; *NDA* is non-discretionary total accruals estimated from the fitted coefficients generated from benchmarks; *DCA* is discretionary current accruals scaled by total assets at the beginning of year; *NDCA* is non-discretionary current accruals estimated from the fitted coefficients generated from benchmarks; *DLA* is discretionary long term accruals scaled by total assets at the beginning of year; *NDLA* is non-discretionary long term accruals estimated from the fitted coefficients generated from benchmarks. *MKTRNT* is the contemporaneous three year buy-and hold market return; *PROCEEDS* is the natural logarithm of the issuing size in monetary units; *ΔNetIncome* is the asset scaled change in net income; *ΔROA* is the change in operating profits on assets; *ΔCFOA* is the change in operating cash flows on assets; *ΔSalesG* is the change in sales growth; *ΔCapExp* is the change in capital expenditure; *ΔATO* is the change in asset turnover; *IR* is the initial return, defined as the percentage difference between the offer price and the closing price on the first day of trading. The following models are estimated:

$$BHR = \alpha_0 + \alpha_1 DA + \alpha_2 NDA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u$$

$$BHR = \beta_0 + \beta_1 DCA + \beta_2 NDCA + \beta_3 DLA + \beta_4 NDLA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u$$

	Model 3		Model 4	
	coefficient	(*t*-value)	coefficient	(*t*-value)
Intercept	0.4180	(0.53)	0.7323	(0.87)
DA	-0.4615	(-2.12)**		
NDA	-0.1127	(-0.26)		
DCA			-0.4786	(-2.19)**
NDCA			0.4553	(0.97)
DLA			-0.4885	(-2.18)**
NDLA			-0.4973	(-0.99)
PROCEEDS	-0.0253	(-0.28)	-0.0613	(-0.65)
MKTRTN	1.2905	(15.69)***	.1.2626	(15.03)***
ΔNetIncome	1.6291	(3.21)***	1.7249	(3.09)***
ΔROA	0.2885	(0.79)	0.2075	(0.55)
ΔCFOA	0.3308	(1.60)	0.3374	(1.61)
ΔSalesG	-0.0059	(-0.35)	-0.0070	(-0.41)
ΔCapExp	0.0474	(0.92)	0.0570	(1.09)
ΔATO	-0.1193	(-1.21)	-0.1141	(-1.16)
IR	-0.1178	(-4.19)***	-0.1185	(-3.97)***
Adjusted R^2	0.5964		0.5975	

* Significance at the 10% level

** Significance at the 5% level

*** Significance at the 1% level

Table 8: Robustness Checks with Jones (1991) Model

This table presents some results of robustness checks. *IR* is the initial return, defined as the percentage difference between the offer price and the closing price on the first day of trading; *PROCEEDS* is the natural logarithm of the issuing size in monetary units; *IMKTRTN* is the return on general market index during the period between offering and listing; *DA* is discretionary total accruals scaled by total assets at the beginning of year; *NDA* is non-discretionary total accruals estimated from the fitted coefficients generated from benchmarks; *DCA* is discretionary current accruals scaled by total assets at the beginning of year; *NDCA* is non-discretionary current accruals estimated from the fitted coefficients generated from benchmarks; *DLA* is discretionary long term accruals scaled by total assets at the beginning of year; *NDLA* is non-discretionary long term accruals estimated from the fitted coefficients generated from benchmarks. The following equations are estimated:

$$IR = \alpha_0 + \alpha_1 DA + \alpha_2 NDA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u$$

$$IR = \beta_0 + \beta_1 DCA + \beta_2 NDCA + \beta_3 DLA + \beta_4 NDLA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u$$

	the modified Jones (1991)		the original Jones (1991)	
Model	1	2	1	2
Intercept	1420.30	1385.82	1437.33	1454.92
	(9.96)***	(10.81)***	(9.78)***	(9.71)***
DA	34.65		37.08	
	(2.06)**		(2.23)**	
NDA	95.53		32.99	
	(1.53)		(0.73)	
DCA		36.46		39.81
		(2.12)**		(2.33)**
NDCA		8.85		-15.95
		(0.11)		(-0.25)
DLA		35.47		35.23
		(1.85)*		(1.79)*
NDLA		145.98		42.17
		(1.50)		(0.84)
PROCEEDS	-150.17	-146.37	-152.31	-154.51
	(-9.16)***	(-9.89)***	(-9.00)***	(-8.93)***
IMKTRTN	2.10	2.12	2.12	2.15
	(4.72)***	(4.67)***	(4.72)***	(4.71)***
Adjusted R^2	0.2879	0.2884	0.2866	0.2853

* Significance at the 10% level

** Significance at the 5% level

*** Significance at the 1% level

Table 9: Robustness Checks with Jones (1991) Model

This table presents some results of multivariate analysis for underperformance. *BHR* is the three-year buy-and-hold return; *DA* is discretionary total accruals scaled by total assets at the beginning of year; *NDA* is non-discretionary total accruals estimated from the fitted coefficients generated from benchmarks; *DCA* is discretionary current accruals scaled by total assets at the beginning of year; *NDCA* is non-discretionary current accruals estimated from the fitted coefficients generated from benchmarks; *DLA* is discretionary long term accruals scaled by total assets at the beginning of year; *NDLA* is non-discretionary long term accruals estimated from the fitted coefficients generated from benchmarks. *MKTRNT* is the contemporaneous three year buy-and hold market return; *PROCEEDS* is the natural logarithm of the issuing size in monetary units; *ΔNetIncome* is the asset scaled change in net income; *ΔROA* is the change in operating profits on assets; *ΔCFOA* is the change in operating cash flows on assets; *ΔSalesG* is the change in sales growth; *ΔCapExp* is the change in capital expenditure; *ΔATO* is the change in asset turnover; *IR* is the initial return, defined as the percentage difference between the offer price and the closing price on the first day of trading. The following models are estimated:

$$BHR = \alpha_0 + \alpha_1 DA + \alpha_2 NDA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u$$

$$BHR = \beta_0 + \beta_1 DCA + \beta_2 NDCA + \beta_3 DLA + \beta_4 NDLA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u$$

	Model 3		Model 4	
	coefficient	(*t*-value)	coefficient	(*t*-value)
Intercept	0.2543	(0.32)	0.2129	(0.26)
DA	-0.4652	(-2.16)**		
NDA	0.2012	(0.63)		
DCA			-0.4925	(-2.31)**
NDCA			0.5492	(1.30)
DLA			-0.4963	(-2.27)**
NDLA			0.0679	(0.22)
PROCEEDS	-0.0076	(-0.08)	-0.0012	(-0.01)
MKTRTN	1.2791	(15.87)***	1.2616	(15.38)***
ΔNetIncome	1.6275	(3.20)***	1.6564	(3.21)***
ΔROA	0.3024	(0.83)	0.3350	(0.88)
ΔCFOA	0.3241	(1.57)	0.3389	(1.66)
ΔSalesG	-0.0057	(-0.36)	-0.0060	(-0.36)
ΔCapExp	0.0681	(1.33)	0.0631	(1.22)
ΔATO	-0.1160	(-1.19)	-0.1118	(-1.13)
IR	-0.1142	(-4.08)***	-0.1149	(-4.02)***
Adjusted R^2	0.6009		0.6008	

* Significance at the 10% level

** Significance at the 5% level

*** Significance at the 1% level

Table 10: Robustness Checks with Newey-West HAC Standard Errors

This table presents some results of robustness checks. *IR* is the initial return, defined as the percentage difference between the offer price and the closing price on the first day of trading; *PROCEEDS* is the natural logarithm of the issuing size in monetary units; *IMKTRTN* is the return on general market index during the period between offering and listing; *DA* is discretionary total accruals scaled by total assets at the beginning of year; *NDA* is non-discretionary total accruals estimated from the fitted coefficients generated from benchmarks; *DCA* is discretionary current accruals scaled by total assets at the beginning of year; *NDCA* is non-discretionary current accruals estimated from the fitted coefficients generated from benchmarks; *DLA* is discretionary long term accruals scaled by total assets at the beginning of year; *NDLA* is non-discretionary long term accruals estimated from the fitted coefficients generated from benchmarks. The following equations are estimated:

$$IR = \alpha_0 + \alpha_1 DA + \alpha_2 NDA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u$$

$$IR = \beta_0 + \beta_1 DCA + \beta_2 NDCA + \beta_3 DLA + \beta_4 NDLA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u$$

	White (1980)		Newey-West (1987)	
Model	1	2	1	2
Intercept	1420.30	1385.82	1420.30	1385.82
	(9.96)***	(10.81)***	(9.79)***	(10.40)***
DA	34.65		34.65	
	(2.06)**		(2.00)**	
NDA	95.53		95.52	
	(1.53)		(1.55)	
DCA		36.46		36.46
		(2.12)**		(2.01)**
NDCA		8.85		8.85
		(0.11)		(0.11)
DLA		35.47		35.47
		(1.85)*		(1.86)**
NDLA		145.98		145.98
		(1.50)		(1.47)
PROCEEDS	-150.17	-146.37	-150.17	-146.37
	(-9.16)***	(-9.89)***	(-8.99)***	(-9.52)***
IMKTRTN	2.10	2.12	2.10	2.12
	(4.72)***	(4.67)***	(4.72)***	(4.67)***
Adjusted R^2	0.2879	0.2884	0.2879	0.2884

* Significance at the 10% level

** Significance at the 5% level
*** Significance at the 1% level

Table 11: Robustness Checks with Newey-West HAC Standard Errors.

This table presents some results of multivariate analysis for underperformance. *BHR* is the three-year buy-and-hold return; *DA* is discretionary total accruals scaled by total assets at the beginning of year; *NDA* is non-discretionary total accruals estimated from the fitted coefficients generated from benchmarks; *DCA* is discretionary current accruals scaled by total assets at the beginning of year; *NDCA* is non-discretionary current accruals estimated from the fitted coefficients generated from benchmarks; *DLA* is discretionary long term accruals scaled by total assets at the beginning of year; *NDLA* is non-discretionary long term accruals estimated from the fitted coefficients generated from benchmarks. *MKTRNT* is the contemporaneous three year buy-and hold market return; *PROCEEDS* is the natural logarithm of the issuing size in monetary units; *ΔNetIncome* is the asset scaled change in net income; *ΔROA* is the change in operating profits on assets; *ΔCFOA* is the change in operating cash flows on assets; *ΔSalesG* is the change in sales growth; *ΔCapExp* is the change in capital expenditure; *ΔATO* is the change in asset turnover; *IR* is the initial return, defined as the percentage difference between the offer price and the closing price on the first day of trading. The following models are estimated:

$$BHR = \alpha_0 + \alpha_1 DA + \alpha_2 NDA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u$$

$$BHR = \beta_0 + \beta_1 DCA + \beta_2 NDCA + \beta_3 DLA + \beta_4 NDLA + \sum_{i=1}^{n} \gamma_i \cdot CtrlV_i + u$$

	Model 3		Model 4	
	coefficient	(*t*-value)	coefficient	(*t*-value)
Intercept	0.4180	(0.52)	0.7323	(0.88)
DA	-0.4615	(-2.12)**		
NDA	-0.1127	(-0.26)		
DCA			-0.4786	(-2.18)**
NDCA			0.4553	(0.99)
DLA			-0.4885	(-2.16)**
NDLA			-0.4973	(-1.00)
PROCEEDS	-0.0253	(-0.28)	-0.0613	(-0.65)
MKTRTN	1.2905	(16.29)***	.1.2626	(15.13)***
ΔNetIncome	1.6291	(3.12)***	1.7249	(3.21)***
ΔROA	0.2885	(0.78)	0.2075	(0.52)
ΔCFOA	0.3308	(1.61)	0.3374	(1.60)
ΔSalesG	-0.0059	(-0.36)	-0.0070	(-0.42)
ΔCapExp	0.0474	(1.03)	0.0570	(1.23)
ΔATO	-0.1193	(-1.17)	-0.1141	(-1.13)
IR	-0.1178	(-4.42)***	-0.1185	(-4.17)***
Adjusted R^2	0.5964		0.5975	

* Significance at the 10% level

** Significance at the 5% level

*** Significance at the 1% level

Figure 1: Cumulative returns to an equally-weighted portfolio of 506 initial public offerings in 1998-2003, with monthly rebalancing.

Two series of cumulative returns are plotted over the 36 event months after going public: 1) market-adjusted, which represents the cumulative abnormal return (CAR) with adjustment for market performance; 2) Raw Unadjusted, which represents the cumulative return with no adjustment for market performance

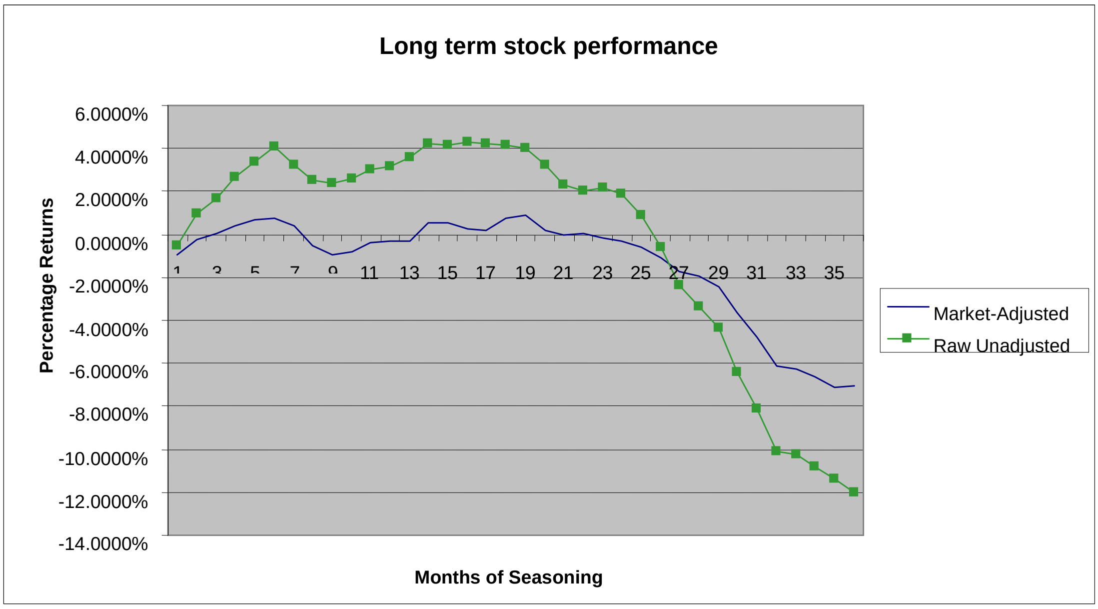
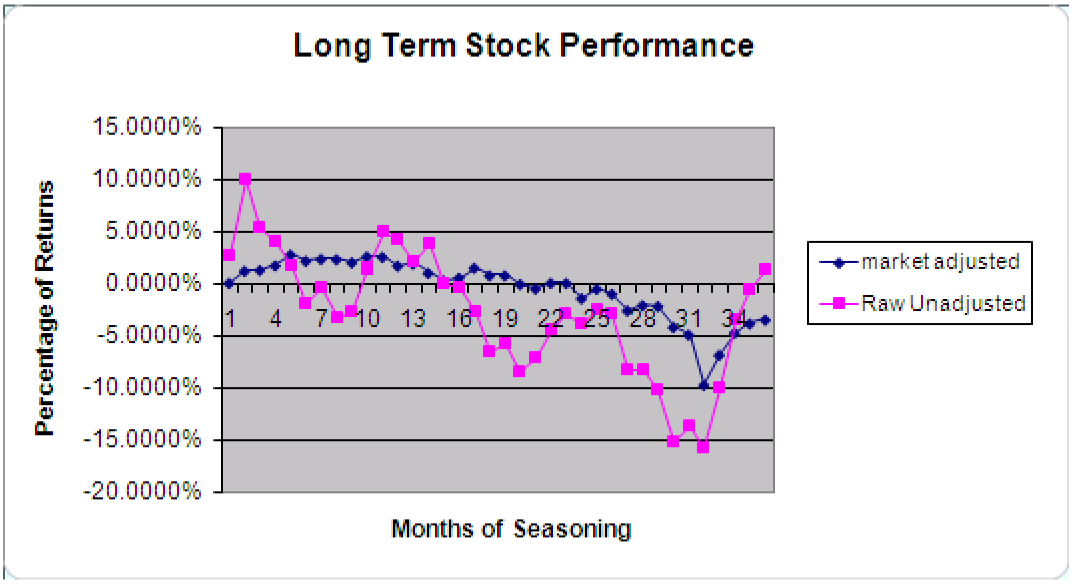


Figure 2: Cumulative returns to an equally-weighted portfolio of 506 initial public offerings in 1998-2003, with monthly rebalancing.

Two series of cumulative returns are plotted over the 36 calendar months after going public: 1) market-adjusted, which represents the cumulative abnormal return (CAR) with adjustment for market performance; 2) Raw Unadjusted, which represents the cumulative return with no adjustment for market performance



Appendix: Accruals estimation procedure

Following previous research, we use discretionary accruals as a proxy for earnings management[13]. As adjustments to cash flows, total accruals (*AC*) in a given year are defined as reported earnings or net income in excess of operating cash flow:

$$AC \equiv \text{Net Income} - \text{Operating Cash Flow} \tag{A1}$$

Since issuers may have a preference for discretion over short- and long-term accruals (Guenther 1994), we distinguish between the current and long-term components of total accruals and evaluate them separately. Current accruals (*CA*) are defined as the change in non-cash current assets minus the change in operating current liabilities,

$$\begin{aligned} CA \equiv\ & \Delta\ [\text{Current Assets} - \text{Cash and Cash Equivalents}] \\ & - \Delta\ [\text{Current Liabilities} - \text{Current Maturity of Long-term Debts}] \end{aligned} \tag{A2}$$

Some accrual adjustments are appropriate and necessary given the business conditions typically faced by firms in their industry. Without information on actual economic events and the timing of inflows and outflows, it is difficult for investors to infer the extent to which accruals are adjusted. In event studies, we use benchmarks to define abnormal returns. Likewise we need benchmarks further to decompose accruals into two parts, one described by firm and industry conditions and the other presumed to be managed by issuers.

We use the modified Jones cross-sectional model (Dechow et al. 1995) for this purpose.[14] "The cross-sectional approach automatically adjusts for the effects of fluctuating industry-wide economic conditions that influence accruals independent of any earnings management in each year." (Teoh et al. 1998b: 1940) Generally, current accruals are regressed on the change in sales in a cross-sectional regression using non-IPO benchmarks in the same industry *j* on a yearly basis. Non-IPO firms with at least two years of trading records in the market are used as benchmarks. All variables in the regression are scaled by the firm's total assets (*TA*) at the beginning of each fiscal year *t*.

$$\frac{CA_{j,t}}{TA_{j,t-1}} = \alpha_0\left(\frac{1}{TA_{j,t-1}}\right) + \alpha_1\left(\frac{\Delta Sales_{j,t}}{TA_{j,t-1}}\right) + \varepsilon_{j,t} \tag{A3}$$

The fitted current accruals of the issuers *i* in a given year *t* are calculated using the estimated coefficients from the regression and the change in sales net of the change in accounts receivable. The change in accounts receivable (*ARec*) is subtracted from the change in sales to allow for the possibility of sales manipulation. Fitted current accruals are considered to be the level necessary to support the firm's sales increase and are termed non-discretionary current accruals (*NDCA*).

$$NDCA_{i,t} \equiv \hat{\alpha}_0\left(\frac{1}{TA_{i,t-1}}\right) + \hat{\alpha}_1\left(\frac{\Delta Sales_{i,t} - \Delta A\mathrm{Re}c_{i,t}}{TA_{i,t-1}}\right) \tag{A4}$$

The regression residual is presumed to be that part of accruals that is not to be dictated by firm and industry conditions but instead to have been managed. It is termed discretionary current accruals (*DCA*):

[13]For example, Jones (1991), Dechow et al. (1995), Subramanyam (1996), Teoh et al. (1998a) and (1998b), Rangan (1998), Hribar and Collins (2002), Kim and Park (2005).

[14] We do not use other models such as Dechow and Dichev (2002) as the data before companies go public are not readily available for our sample of Chinese IPOs.

$$DCA_{i,t} \equiv \frac{CA_{i,t}}{TA_{i,t-1}} - NDCA_{i,t} \tag{A5}$$

To obtain discretionary and non-discretionary long-term accruals, we first estimate discretionary and non-discretionary total accruals. The discretionary total accrual (*DAC*) for firm *i* for year *t* is calculated in a manner similar to the current accrual except now the total accrual is used as the dependant variable and the regression includes gross property, plant, and equipment (*PPE*) as an additional explanatory variable.

$$\frac{AC_{j,t}}{TA_{j,t-1}} = \beta_0\left(\frac{1}{TA_{j,t-1}}\right) + \beta_1\left(\frac{\Delta Sales_{j,t}}{TA_{j,t-1}}\right) + \beta_2\left(\frac{PPE_{j,t}}{TA_{j,t-1}}\right) + \varepsilon_{j,t} \tag{A6}$$

Non-discretionary total accruals (*NDA*) and discretionary total accruals (*DA*) calculated as:

$$NDA_{i,t} \equiv \hat{\beta}_0\left(\frac{1}{TA_{i,t-1}}\right) + \hat{\beta}_1\left(\frac{\Delta Sales_{i,t} - \Delta A\,\mathrm{Re}\,c_{i,t}}{TA_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{PPEi_{,t}}{TAi_{,t-1}}\right) \tag{A7}$$

$$DA_{i,t} \equiv \frac{AC_{i,t}}{TA_{i,t-1}} - NDA_{i,t} \tag{A8}$$

Non-discretionary long-term accruals (*NDLA*) are defined as the difference between non-discretionary total accruals and non-discretionary current accruals. Discretionary long-term accruals (*DLA*) are the difference between asset-scaled long-term accrual and non-discretionary long-term accruals.

$$NDLA_{i,t} \equiv NDA_{i,t} - NDCA_{i,t} \tag{A9}$$

$$DLA_{i,t} \equiv \frac{AC_{i,t} - CA_{i,t}}{TA_{i,t-1}} - NDLA_{i,t} \tag{A10}$$