Earnings Management around Initial Public Offerings: Evidence from Taiwan

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Abstract

Using a sample of 127 companies that initially listed their stocks on Taiwan Stock Exchange during the 1986-1992 period, this study examines earnings management of IPO firms. By examining earnings, cash flows and the discretionary accruals six years prior to and four years after IPO, the study finds that the IPO firms do engage in earnings management. First, the time series patterns of earnings and cash flows demonstrate a steady upward trend for the pre-IPO years and a downward trend for the post-IPO years. Discrepancy in the time series patterns of earnings and cash flows reveals two types of earnings management—real earnings management and pure accounting manipulations. Second, based on two accrual-based models for detecting earnings management, the time series of estimated discretionary accruals further supports the earnings management hypothesis. Finally, analysis of four individual accrual items suggests that the IPO firms engage in earnings management on a portfolio basis—engaging in income-increasing earnings management to boost reported earnings through some accruals. (e.g., bad debt and R&D expenditure) and income-decreasing earnings management possibly for tax reason through other accruals (e.g., depreciation).

Keywords: Initial Public Offerings, Earnings Management, Accounting Manipulations, Accruals.

Introduction

Firms with initial share listing or offerings are required to make a number of mandatory disclosures in prospectus, on which the prices of the new listed shares are based. The highlight of the mandatory disclosure often falls on the history of reported earnings. Such a practice provides incentives of earnings management for the managers of the firms with initial public offerings (IPO)[1]. In Taiwan, anecdotal evidence suggested that IPO firms manipulate accounting earnings for listing.[2] Before IPO, the operating results for a great proportion of companies demonstrate a bright performance but decline substantially after the offerings, raising the doubt for the existence of earnings management by the IPO firms. This phenomenon is particularly severe for accounting earnings. As a result, accusation that IPO firms manage earnings to inflate offering prices ensues and results in widespread public demands for government actions.

The purpose of this study is to investigate whether and how IPO firms manage earnings to raise offering prices. A large body of accounting research investigates whether managers exercise their accounting discretion to influence reported accounting numbers. The standard methodology frequently begins with an economic or political setting where the reported accounting numbers influence the wealth of managers, creating the incentives for earnings management. Following this line of research, this study provides evidence on earnings management, based on 127 Taiwan Stock Exchange companies in the scenario of initial public offerings. The determination of the offering prices is based on a weighted average of book value, earnings per share, dividend yield and interest rate of one-year certificate of deposit.[3]

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[1] Strictly speaking, an initial public offering is not exactly the same as an initial listing. However, the current literature often uses initial public offering to refer to an intial listing. The current study follows this convention.

[2] From time to time, newspaper reports companies inflating earnings for IPOs. For examples, see Liao (1996), Chiou (1998) and Tseng (1996)。

[3] The formula for the offering price provided by the Securities and Futures Commission (Taiwan) takes the following form: P = A*40%+B*20%+C*20%+D*20%. A = (the average price-earnings ratio of comparable firms for the last three years)*(the average of earnings per share for the last three years); B = (the average dividend per share for the last three years)/(the average payout of comparable firms for the last three years); C = The book value per share for the last year; D = (the estimated dividend per share for the offering year)/(the interest rate for one-year term

Because of the major impact of the offering prices on their private wealth and the explicit use of accounting numbers, particularly accounting earnings, the managers and the major stockholders of IPO firms have the incentives to manage earnings numbers to maximize their private wealth.[4]

This study differs from previous literature in three important ways.[5] First, previous studies on earnings management usually focus on particular year. The IPO event provides a distinguished research issue since the event period involves a longer period (four years) rather than one year.[6] Therefore, instead of focusing on the changes in discretionary accruals in a particular point in time, the research design in this research particularly emphasizes the time series of discretionary accruals and its relation to cash flows. Previous studies on earnings management and IPO frequently involve comparison of accruals between the pre- and post-IPO periods. Since an IPO event by itself indicates a change in the economy of the firm, evidence based on a simple comparison of the accruals for the two periods is likely to be biased.[7] For instance, Wu (2000) find that companies engage in earnings management only in IPO year but not in the pre-IPO years. The result, however, is not consistent with earnings management in the scenario of IPO since the pricing formula for an IPO involve a three-year period before IPO and offering price the is likely to be influenced by the earnings of IPO year. Tai (2000) conducts a trend analysis of discretionary accruals, cash flows and earnings beginning from year −2 and only find earnings management for the IPO year. Second, the current study focuses both on total accruals and individual accruals. A simultaneous investigation of both is important since comparison of both provides additional insight on the behavior of earnings

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certified deposit).

[4] In addition, information asymmetry is also more serious for the IPO firms than the seasoned firms. The scarcity of information about the issuers forces investors to rely heavily on the prospectus, which contains only a few years of financial statements.

[5] Although earnings management has been a subject of many studies for a long time, to the best of the author's knowledge, no published work examines earnings management in the setting of new share listing in Taiwan.

[6] Four years include the IPO year and the three years before IPO. During this period, managers have the incentive to manage earnings. This institutional background is rather unique. For instance, there is no explicit pricing formula in the United States. An earnings management study in the setting of IPO can focuse on the IPO year only (Friedlan, 1994).

[7] This is a research design issue when there is a non-zero correlation between the partitioning event (IPO event in this study) and omitted variables (McNicholes, 2000).

management that would not be obtained if they are analyzed independently. For instance, Lian (1996) is unable to detect earnings management with individual discretionary accruals. The results in this study reveal that management of a specific discretionary accrual is likely to be event-dependent. Finally, emphasizing the structural changes caused by earnings management, we test the significance of structural changes in the trend of estimated discretionary accruals for the pre- and post-IPO periods.

Overall, the empirical findings in this study are consistent with the earnings management hypothesis. First of all, the time series of earnings of the IPO firms displays a clear trend: an upward trend before IPO, a sudden drop in the IPO year, and a gradual decline after IPO. Several other empirical results are obtained. First, evidence provided by two accrual-based models for detecting earnings management supports the existence of earnings management. Second, by focusing on the time-series pattern of four discretionary components of earnings commonly claimed to be targets of earnings management, this study provides further evidence on how IPO firms manage reported earnings. The results for individual accruals appear to be mixed. Third, the Chow tests and dummy regressions support a significant change in the regimes of estimated discretionary accruals. The remainder of this paper is organized as follows. Section two describes sample selection and variable measurement; Section three examines the time-series pattern of earnings and cash flows; Section four explores how individual accruals are managed to maximize the offering price. Section five provides tests on structural changes. Section six summarizes and concludes the study.

Sample and Research Methods

1. Sample Selection

The sample in this study includes 127 industrial firms that initially listed their shares on Taiwan Stock Exchange during the 1986-1992 period.[8] The study chooses

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[8] In this period, there are 133 IPOs. We exclude four banking firms and two non-calendar firms, leaving 127 firms in the study sample.

1986 as the beginning year in consideration of the potential structural changes in the stock market during the mid-80s. All the firms have December 31 as their fiscal year ends. Financial statement data for these firms include six years before and four years after the IPO year. In other words, the financial data cover the 1980-1996 period. The data source comes from the financial statement files of *the Taiwan Economic Journal*.

2. Variable Measurement

The variable measurement generally follows previous studies. The following variables are used throughout this study.

Total accrual = (-Change in cash + change in current assets − change in current liabilities − depreciation expenses − change in current maturity of long-term debt − change in income taxes payable)/beginning total assets.

Earnings = Net income/ beginning common equity.

Cash flows = Cash flows from operation/ beginning common equity.

Bad debt = Changes in allowance for bad debt/beginning gross accounts receivables.

Depreciation = Depreciation expense/ending gross fixed assets.

Sales discounts and returns = Sales discounts and returns/gross sales.

Other revenues = Other revenues/operating revenues.

All the variables are deflated by related variables primarily to mitigate the effect of cross-sectional variation from firm size. As in previous studies, total accrual is used as a proxy for the non-discretionary accruals for estimation purpose. Although slightly different versions of total accruals have been used in previous studies (e.g., Healy 1985; Han and Wang 1998, among others), the definition of total accrual in this study follows the commonly-used definition (e.g., Healy 1985; Jones 1991; Dechow et al. 1995). Earnings variable is the total net income deflated by common equity to adjust for cross-sectional difference in size. This definition is equivalent to

return on common equity (ROCE). Cash flows are measured as the cash flows from operating activities deflated by common equity. These two variables follow Burgstahler and Dichev (1997).

Relative year is used to index the time-series observations according to the distance to the IPO event. Year 0 refers to the IPO event year. Year –1 (1) refers to the first year before (after) IPO and so on. The following sections provide empirical evidence.

Time-series Analysis of Earnings and Cash Flows

It is well-established that a change in the relationship between cash flows and earnings is a red flag for potential accounting manipulations or earnings management. Given this, the study first examines both the time series of cash flows and earnings and their relationship. In the results reported below, the study focuses on the time series of the mean and median earnings and cash flows for the IPO firms in the first subsection. Subsection 3.1 presents and discusses the time-series evidence on annual earnings and cash flows. Subsection 3.2 evaluates the time-series evidence on quarterly earnings.

1. The Time Series Pattern of Annual Earnings and Cash Flows- Preliminary Evidence

The earnings management hypothesis predicts that earnings increase before IPO and decrease after IPO. Table 1 exhibits the time-series pattern of earnings and cash flows six years prior to and four years after IPO—i.e., years –6 to 4. Earnings and cash flows are respectively after-tax income and cash flow from operation deflated by the beginning-of-the-year common equity. In panel A, it is clear that the average earnings continuously increase from 13% for year –6 to 26% for year -2. Mean earnings then decrease to 24% for year –1 and 21% for year 0. For the next four years (years 1 to 4), earnings continuously decrease—from 15% to 7%. Similar pattern occurs in median earnings. It should be noted that earnings for year 1 exhibit an abrupt decrease from the IPO year—a drop of about 6%. Earnings decline to about the level of 7% for years 3 and 4. The earnings pattern for the years before and

after the IPO is consistent with the earnings management hypothesis—an inverted U shape.

Panel B presents the time series of cash flows. It is also clear that average cash flows are higher for pre-IPO period than for the post-IPO period. Cash flows reach the highest level in year –1 (24%) and is followed by a drop of 5% to about 19% for the IPO year. Then a dramatic drop occurs in year 1 (from 19% to 8%), demonstrating a trend similar to that of earnings. Besides, it should be noted that the gap between earnings and cash flows varies over time and the time series of the gap provides indirect evidence on earnings management. Although it is legitimate for earnings to differ from cash flows, a steady relationship is expected between the two if firms' accounting policies are applied consistently (Bernard et al. 1997).

Several interesting relations are worth noting: First, earnings are higher than cash flows for a significant amount (about 5%) over years –3 and –2 (the first two years of earnings to be included in the pricing formula). The difference narrows from year 2 (second year after IPO) and cash flows appear to be slightly higher than earnings. Given that cash flows are not subject to accounting manipulation, the relation suggests the presence of earnings management. Second, the difference between mean and median statistics for earnings and cash flows is also noteworthy. It is obvious that the difference between mean and median earnings becomes wider from year –4 and remains around 4-5% until year -1. The two statistics stay relatively close in other periods, suggesting a structural change in accounting process for the period of earnings being in the pricing formula.[9] Again, this phenomenon is consistent with the construct of accrual accounting—in the absence of earnings management and in the long term, cash flows and earnings from accrual accounting tend to converge.

Cash flows are difficult to manipulate through accounting choices. Given that earnings management can be achieved through accrual items, the difference between earnings and cash flows can be an inference basis for the managerial behavior in earnings management. Panels A and B show that both the time series of earnings and

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[9] A wider distance between mean and median for the period suggests that a portion of firms rely more heavily on accounting manipulations to inflate reported earnings, raising the mean statistics.

cash flows increase before IPO and decrease after IPO. However, earnings are generally higher than cash flows before IPO (years –4 to 1) and are marginally lower than cash ·flows after IPO (years 2 to 4). This relation and the reversal between the two series reflect accrual accounting process and suggest two types of earnings management—"real earnings management" and pure accounting manipulations.[10] First, firms do engage in real earnings management before IPO as evidenced by the time-series pattern of cash flows. Next, the evidence that earnings are higher than cash flows for the pre-IPO period suggests that the IPO firms also engage in accounting type of earnings management. Third, the convergence of earnings to cash flows and mean earnings to median earnings after IPO suggests that companies refrain from earnings management after IPO either because of the lack of incentive for accounting type of earnings management after IPO or the exhaustion of discretionary accruals.[11]

2. The Time Series Pattern of Quarterly Earnings and Cash Flows

To provide further evidence on earnings management, Table 2 presents quarterly earnings for four quarters before and after IPO and the IPO quarter. The time series of the four mean quarterly earnings before IPO is 0.077, 0.065, 0.046, and 0.053 from quarters –4 to –1. For the IPO quarter, earnings are 0.057. And after IPO, the quarterly earnings sequence is 0.047, 0.041, 0.035, and 0.038 from quarters 1 to 4, demonstrating a rather stable decrease in quarterly earnings. It is obvious that the average earnings for any quarter before IPO are generally higher than any quarter after IPO. It is worth noting that the average earnings for IPO quarter is about the same level as the quarter before. This is consistent with the general observation that managers tend to manage earnings to maintain a "honey moon period" for the stock price after IPO.[12]

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[10] Real earnings management means that firms improve earnings performance by operating activities not by accounting manipulations (Schipper, 1989).

[11] Due to accounting equation, an income-increasing earnings management will lead to an income-decreasing accrual in the future.

[12] In a study of US IPO firms, Teoh, Welch and Wong (1998) argue that the incentive to manage earnings are likely to persist in the months immediately after the offering. First, managers usually can not dispose of their personal holdings until several months after the IPO. Besides, firms face

Table 1   Time series of earnings and cash flows

Year	N	Mean	Median	Std Dev	Max	Min
A. Earnings						
-6	15	0.1311	0.1161	0.1912	0.5538	-0.2013
-5	48	0.1335	0.1250	0.2138	0.7716	-0.8440
-4	82	0.2065	0.1562	0.2449	0.9969	-0.7483
-3	104	0.2511	0.1995	0.2122	0.9960	-0.3908
-2	122	0.2622	0.2248	0.1864	0.8268	-0.0398
-1	123	0.2415	0.2093	0.1533	0.8041	0.0245
0	126	0.2084	0.1897	0.1385	0.9699	-0.1358
1	127	0.1540	0.1247	0.1442	0.8960	-0.2452
2	126	0.0966	0.0910	0.1343	0.4448	-0.6456
3	127	0.0675	0.0699	0.1368	0.4302	-0.8921
4	127	0.0734	0.0663	0.1101	0.5129	-0.2753
B. Cash flows from operation						
-6	3	0.3044	0.3231	0.1467	0.4409	0.1493
-5	18	0.2310	0.2126	0.4336	0.9875	-0.8576
-4	42	0.1958	0.1898	0.3879	0.8956	-0.9904
-3	83	0.1897	0.1831	0.3652	0.9755	-0.9671
-2	114	0.2047	0.2203	0.3665	0.9850	-0.9402
-1	121	0.2401	0.2367	0.2826	0.9231	-0.8090
0	123	0.1929	0.2192	0.2961	0.9978	-0.8303
1	122	0.0825	0.1113	0.2509	0.6256	-0.9631
2	126	0.0940	0.1011	0.1870	0.5573	-0.6455
3	127	0.0781	0.0955	0.1758	0.4529	-0.7262
4	126	0.0950	0.1000	0.1635	0.6237	-0.6359

Earnings= net income/beginning-of-period common equity. Cash flows = cash flows from operation/beginning-of-period common equity.

unusual legal and possible reputational scrutiny in the IPO aftermath. Immediate accounting reversals may render earnings management activities transparent enough to trigger law suits against the firm and its managers.

Table 2   Time series of mean quarterly earnings

Quarter	N	Mean	Median	Std. Dev.	Max	Min
-4	109	0.0773	0.0543	0.1063	0.5843	-0.1613
-3	115	0.0646	0.0511	0.0645	0.4339	-0.0993
-2	122	0.0460	0.0505	0.0741	0.4851	-0.3421
-1	119	0.0525	0.0430	0.0549	0.4755	-0.0697
0	124	0.0566	0.0411	0.0677	0.4475	-0.0555
1	123	0.0468	0.0392	0.0512	0.3269	-0.0863
2	126	0.0412	0.0388	0.0713	0.5555	-0.2303
3	123	0.0352	0.0325	0.0484	0.2326	-0.1497
4	126	0.0378	0.0310	0.0569	0.4492	-0.1166

Overall, the pattern of average earnings and cash flows provides affirmative evidence for the existence of earnings management—including real earnings management and the pure accounting manipulations.

Evidence on the methods of earnings management

The evidence presented in section 3 provides preliminary evidence of earnings management through accounting manipulations and real operating activities.   The time series of and the gap between cash flows and earnings provide only preliminary evidence of earnings management. This section further investigates earnings management based on accrual-based models.

A precise separation of discretionary accruals from nondiscretionary accruals is difficult and changes in total accruals also depend on the economic circumstances of the IPO firms and the generating process of nondiscretionary accruals. In light of this, studies of earnings management typically consider specific scenarios for earnings management (in this study, the initial public offerings) and then test whether discretionary accruals have been managed by assuming particular discretionary accrual models or generating process of nondiscretionary accruals. Following this methodology, this section presents two types of evidence. First, I examine the time-

series pattern of discretionary accruals using two models of discretionary accruals examined in Dechow et al. (1995). The examination will give evidence regarding the existence of earnings management. Second, I select a set of potential earnings manipulators as proposed in literature and evaluate their time series. In either case, it is expected that the manipulated components of reported income will tend to be income-increasing for pre-IPO period relative to the post-IPO period if these components have been managed to create income-increasing effects for IPO.

1. Evidence on the Total Discretionary Accruals

This subsection presents time-series evidence on discretionary accruals as estimated from two accrual-based models for detecting earnings management—the Jones model and the industry model.[13]

The Jones Model   The Jones model has been extensively used in earnings management studies and may be the best alternative currently available (Bernard and Skinner, 1996; Thomas and Zhang, 1999). This model estimates the discretionary accrual based on an ordinary least squares (OLS) regression which regresses total accrual on the inverse of total asset, change in revenue, and gross property plant and equipment (Jones 1991). The financial data of years –6 to –4 are used to estimate model parameters. Discretionary accrual is defined as the residual of the regression. Table 3 presents the pattern of observed, predicted, and residual accruals (the estimated discretionary accruals) in mean and median statistics for the period running from years –3 to 3.[14] The time-series of mean residuals shows an upward trend before the IPO year (0.0056, 0.0159, and 0.0495) and then experiences a dramatic decrease in the IPO year (from 0.0495 to 0.0176). The mean residual demonstrates a steady downward trend for the post-IPO period—0.0176, 0.0046, 0.0039 and -0.0086 for

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[13] Some studies use the DeAngelo model and the Healy model. However, the random walk assumptions underlying the DeAngelo model is too restrictive in the case of IPO event. The DeAngelo model uses previous year's total accrual as an estimate of current year's non-discretionary accrual. Such an assumption is appropriate only when earnings management occurs in a single year. When earnings management involves more than two years as in IPO, the estimated non-discretionary accrual from this model will be biased if previous year's earnings are managed. The Healy model has similar problem.

[14] Years –3 to 3 are the predictive period.   The residuals are estimated from the regression model using data from years –6 to –4.

years 0 to 3 respectively. The median residual exhibits similar time series pattern—a steady upward and downward trend from 0.0099 to −0.0213. Both the mean and median statistics show that the discretionary accrual reaches its highest value in year −1 and declines dramatically in year 0.

Table 3   The Jones Model

Year	N	Mean			Median		
		Observed	Predicted	Residual	Observed	Predicted	Residual
-3	84	-0.0506	-0.0563	0.0056	-0.0536	-0.0423	0.0014
-2	116	-0.0371	-0.0530	0.0159	-0.0336	-0.0366	0.0126
-1	123	0.0012	-0.0483	0.0495	-0.0119	-0.0371	0.0322
0	124	-0.0189	-0.0365	0.0176	-0.0161	-0.0297	0.0099
1	120	-0.0237	-0.0283	0.0046	-0.0240	-0.0253	0.0028
2	126	-0.0200	-0.0238	0.0039	-0.0231	-0.0194	0.0005
3	125	-0.0335	-0.0248	-0.0086	-0.0411	-0.0211	-0.0213

$$NDA_\tau = \alpha_1(1/A_{\tau-1}) + \alpha_2(\Delta REV_\tau) + \alpha_3(PPE_\tau)$$

$NDA\tau$ = nondiscretionary accruals in year τ.

$\Delta REV\tau$ = change in revenue in year τ deflated by the beginning total asset; $PPE\tau$ = the year-end property, plant, and equipment of year τ deflated by the beginning total assets.

$A\tau-1$= beginning total asset; The predicted value is used to proxy for nondiscretionary accruals. The residual term is used to proxy for the discretionary accruals.

In interpreting the time-series pattern of residual, it is important to consider the reversal property of discretionary accruals. Because a current income-increasing discretionary accrual will incur a future reversal of an income-decreasing accrual, managers have the incentive to schedule the timing of discretionary accruals to maximize the present value of their personal wealth. In other words, it is not in the interest of managers to create income-increasing accruals far before IPO. On the contrary, since the offering price is based on the average earnings of the last three years before IPO, it is optimal for the managers to exercise their discretion on accruals to maximize earnings for the three-year period before IPO. In addition, since earnings growth enhances the attractiveness of the stock offered, managers also have the incentive to forge an image of earnings growth. Because year −1 is the last year that managers can exercise their discretion on accruals to inflate offering prices, a

dramatic decline in discretionary accruals is expected for year 0. For this reason, particular attention is focused on the change from years −1 to 0. The sudden decline in estimated discretionary accruals in year 0 corroborates the prediction and is consistent with earnings management.

The Industrial Model   The industrial model proposed by Dechow and Sloan (1991) relaxes the assumption in the Jones model that nondiscretionary accruals are constant over time. Instead, they assume that variation in the determinants of nondiscretionary accruals is common across firms in the same industry. This model regresses total accruals of individual firms on median total accruals of the industry with OLS. The residual of the regression is the estimated discretionary accrual. Table 4 presents the mean and median statistics of the observed, predicted and residual accruals for a seven-year period—from years −3 to 3. From years −3 to -1, the mean residual increases from -0.0211 to 0.0276, followed by a sudden decrease from years −1 to 0 (from 0.0276 to 0.0067). The estimated discretionary accrual shows an evident upward trend from years −3 to −1 (-0.0211, -0.0014, and 0.0276) and a dramatic decline in year 0 (from 0.0276 to 0.0067). The post-IPO period exhibits a gradual decrease from years 0 to 3 (0.0067, 0.0058, 0.0036 and -0.0070). The median statistics follows similar pattern. Again, the time series pattern supports the existence of earnings management.

It is also a concern that the nature of stock market may change in the sample period. As an ancillary test, the study divides the sample into two subperiods (1986-1988 vs. 1989-1992) and tests whether earnings management is different between these two subperiods. The result estimated with the Jones model (reported in footnote) shows that the mean and median estimated discretionary accruals demonstrate an upward trend for the pre-IPO period, followed by a drastic drop. A downward trend is particularly obvious for the second subperiod. [15] The difference between the two subperiods is that the drastic drop in estimated discretionary accrual occurs in year 0

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[15] The results is as follows:

Period		1986-1989			1990-1992	
Year	N	Mean	median	N	Mean	Median
-3	32	-0.021	-0.034	52	0.003	-0.009
-2	51	-0.008	-0.011	65	0.014	0.003
-1	52	0.014	0.015	71	0.055	0.042
0	54	0.034	0.029	70	-0.007	-0.011
1	52	-0.006	0.001	67	0.003	0.000
2	53	0.014	0.006	73	-0.005	-0.008
3	54	-0.004	-0.010	70	-0.017	-0.034

for the second subperiod. The result with the industry model also shows a similar pattern with the whole sample—the drastic drop occurs in year 0 for both subperiods. Overall, the results show no significant different change in earnings management pattern during the whole sample period.

Table 4   The Industrial Model

Year	N	Mean			Median		
		Observed	Predicted	Residual	Observed	Predicted	Residual
-3	87	-0.0398	-0.0225	-0.0211	-0.0494	-0.0310	-0.0089
-2	118	-0.0367	-0.0318	-0.0014	-0.0336	-0.0350	0.0037
-1	123	0.0012	-0.0260	0.0276	-0.0119	-0.0308	0.0176
0	125	-0.0159	-0.0245	0.0067	-0.0157	-0.0284	0.0139
1	122	-0.0176	-0.0234	0.0058	-0.0239	-0.0287	0.0054
2	127	-0.0231	-0.0267	0.0036	-0.0234	-0.0278	0.0082
3	125	-0.0335	-0.0264	-0.0070	-0.0411	-0.0271	-0.0086

$NDA_r = \gamma_1 + \gamma_2 \, median_t(TA_r)$.

Median$_t$ (TA_r) = the median value of total accrual scaled by lagged total assets for all non-sample firms in the same 2-digit industry code. The predicted value is used to proxy for nondiscretionary accruals. The residual term is used to proxy for the discretionary accruals.

2. Evidence on Components of Earnings

The evidence provided in this section focuses on individual accruals. Although earnings management takes many forms, we select four items claimed to be common items for earnings management—bad debt, depreciation, sales returns and discount, and research and development expenditure (Lee, 1999; Bernstein and Wild, 1998; Keating and Zimmerman, 2000). Table 5 presents the empirical results.

Bad debt ratio Bad debt is subject to manipulation since the estimated allowance to a great extent depends on the subjective judgement of management. Bad debt ratio in this study is defined as the change in allowance for bad debt deflated by beginning gross receivables. This ratio reflects management's discretionary estimate of the percentage of accounts receivable being uncollectable. Alternatively, allowance for bad debt deflated by year-end receivables can be used to

measure bad debt estimated by the managers. However, given that receivables tend to increase in firm size and that the relation between allowance for bad debt and receivables is likely to be nonlinear, this variable is expected to decreases in time. Thus, this study uses changes in bad debt allowance in the investigation to indicate managers' bad debt decisions. Panel A of Table 5 shows the time series of the mean and median bad debt ratios. The mean statistics demonstrates a steady decreasing trend in the amount of allowance for bad debt from the years –3 to 0—from –0.083 of year –3 to -0.006 of year 0 and largely remains at 0 thereafter. The negative changes indicate a yearly decrease in bad debt allowance for the pre-IPO period. Similar pattern in changes in bad debt ratio does not happen over the post-IPO period and year –4, when earnings is not part of the pricing formula. The balance of bad debt allowance remains relatively constant after the IPO year with the exception of year 2. Compared with the post-IPO period, the evidence seems to suggest that managers tend to scale down bad debt for the pre-IPO period, compared with the post-IPO period. The median bad debt ratio, in contrast, does not show such a pattern. In this case, the median statistics in effect captures the bad debt ratio for those companies that do not engage in earnings management through allowance for bad debt for their IPOs. In other words, a proportion of firms in fact (more than fifty percent of the firms) do not manage earnings through their discretion on the allowance for bad debt.

Depreciation expense Depreciation expense is also considered a common discretionary accrual item that managers can exercise to inflate earnings. Panel B reports the time series of the mean and median depreciation rate as calculated by depreciation expense divided by average gross fixed asset. The pre-IPO depreciation rate is about 0.08 and the post-IPO depreciation rate is about 0.075. Alternatively, the average useful life is about 12.5 years for the pre-IPO period and is about 13 years for the post-IPO period. The evidence is inconsistent with the income-increasing earnings management. In other words, managers exercise income-decreasing earnings management over the pre-IPO period. A possible explanation is earnings management for tax purposes.[16] For the median, the depreciation rate remains

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[16] An observation is that firms engage in income-decreasing earnings management for tax purpose before the integrated tax system (Lee, 1999).

relatively invariant before and after IPO, suggesting that more than half of companies do not manage earnings through depreciation expenses either due to the firm

characteristics (e.g., firms with only minimum amount of fixed assets) or because these companies do not manage earnings. For those companies that manage earnings, they choose income-decreasing earnings management.

Table 5 Time Series of Accrual Items

A. Bad debt ratio

Year	-4	-3	-2	-1	0	1	2	3	4
N	44	85	111	121	123	125	126	127	126
Mean	0.024	-0.083	-0.070	-0.008	-0.006	0.000	-0.007	0.000	0.000
Median	0.016	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Bad debt ratio = (changes in allowance for bad debt) /(beginning gross receivables).

B. Depreciation rate

Year	-4	-3	-2	-1	0	1	2	3	4
N	48	88	118	124	125	126	127	127	127
Mean	0.080	0.083	0.081	0.078	0.075	0.075	0.076	0.075	0.074
Median	0.071	0.075	0.073	0.074	0.073	0.075	0.076	0.073	0.072

Depreciation rate = depreciation expense / average gross fixed assets.

C. Sales returns and discount ratio

Year	-4	-3	-2	-1	0	1	2	3	4
N	70	101	109	119	125	126	127	126	127
Mean	0.008	0.008	0.011	0.010	0.010	0.010	0.012	0.014	0.013
Median	0.003	0.002	0.005	0.004	0.006	0.005	0.007	0.007	0.007

Sales returns and discount/gross sales.

D. Research and development expenditure

Year	-4	-3	-2	-1	0	1	2	3	4
N	25	41	47	78	100	94	90	75	75
Mean	0.092	0.070	0.092	0.097	0.093	0.101	0.122	0.105	0.128
Median	0.016	0.027	0.039	0.045	0.048	0.056	0.072	0.052	0.079

Research and development = Research and development expenses to net income.

Sales return and discount   One approach to inflate earnings is to rush orders unwanted by customers, usually accompanied by sales return or discount in the following year. Panel C reports the time series of the ratio of sales return and discount to gross sales. The time series of this ratio show a certain difference between the pre- and post-IPO periods, particularly for the median statistics. From the median statistics, it appears that a steady increasing trend is observed in this item from year -2. The mean statistics shows a three-stage pattern—about 0.008 for years –4 and –3; about 0.01 from years –2 to 1 and above 0.012 from year 2. Since rushing unwanted orders will be returned by the customers next period. The effects on earnings will cancel out for the neighboring periods. In this case, rushing unwanted orders appears to be less a effective tool for earnings management in a long period, such as in IPO. Consequently, resultant sales returns and discount will be less likely for IPO. Given this, the increasing trend in sales returns and discount appears to reflect a natural business phenomenon unrelated to IPO. Alternatively, the result can be interpreted with the general observation that the economy of certain firms declines after IPO and firms use sales returns and discount to stimulate sales.

Research and development expenses   A technique for earnings management is to time research and development (R&D) expenditure. Unlike most earnings management, the R&D decision involves the timing of the actual transaction. Panel D presents the mean and median statistics of R&D expenditure. R&D expense is deflated by net income rather than sales since the effect on net income is the ultimate concern in earnings management.[17] The mean statistics shows that R&D expenses appear to oscillate around 9% for the pre-IPO years and increase to more than 10% for the post-IPO years. The median also shows a similar pattern. Both time series are consistent with earnings management.

In conclusion, the evidence suggests that the IPO firms uses certain accrual items to enhance reported earnings as claimed in the literature. The evidence indicates that companies do not use all accruals to boost reported income. Since the management of individual accruals involves different cost and benefits, it is optimal for firm to manage one accrual rather another. In other words, in the case of IPO,

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[17] Observations are deleted when the ratio is higher than 0.5 to mitigate the effect of outliers. The value of 1 is also used as a criterion and the results are qualitatively unchanged.

firms manage accruals as a portfolio of accruals, trading off the costs and benefits of earnings management on individual accruals to inflate reported earnings. For instance, IPO firms on average use depreciation expenses as an income-decreasing accrual in the pre-IPO period, possibly for tax purpose and it may involve more cost than benefit to manage sales return and discount in the case of IPO.

Tests on Structural Changes

Previous sections provide evidence on the time series patterns in earnings, cash flows, estimated discretionary accruals, and four individual accrual items. Overall, the evidence is consistent with earnings management around the IPO year. To provide further support on earnings management, this section conducts statistical tests to investigate whether there is structural changes in the time series pattern. The statistical tests focus on the structural changes in the two regimes—pre- and post-IPO periods. The basic logic is as follows. If, as suggested, there exists earnings management, then it is expected that the estimated discretionary income-increasing accruals increase in time before IPO and decrease in time after IPO. In other words, earnings management creates a structural change and the IPO event is the break point. To examine this argument, this study conducts two tests: 1) the Chow test and 2) a regression model including a dummy variable for the post-IPO period to reflect the change in the discretionary accrual items.

1. Chow Tests

The Chow test compares the residual variance of the regression for the pre- and post-IPO periods to examine the existence of a structural change around IPO. As indicated in Tables 3 and 4, discretionary accruals appear to increase for the pre-IPO period and decrease for the post-IPO period. To examine the significance of this trend in the time series pattern, the regression model includes time as the regressor and the estimated discretionary accruals as the dependent variable. The Chow test is based on the following regression model:

$$DA = \alpha + \beta * t + \varepsilon.$$

DA is estimated discretionary accruals. t is the time index beginning from one.

The gist of the regression is to reflect the time series pattern of discretionary accruals and to test whether β differs for the pre- and post-IPO years. Since the IPO year is the year that watersheds the incentive for earnings management, it is not clear whether the IPO year should be included as the pre- or post-IPO year. For this reason, this study alternatively includes the IPO year observations in the first and second periods and excludes the observations from the sample. Table 6 summaries the statistical results. Panels A and B present the Chow tests for the discretionary accruals estimated from the indicated models.

Panel A presents regression results of the Chow test for the Jones model. In applying the Chow test, it is important to choose the break point, which divides the two regimes. Three alternative break points are used to separate the two regimes. The result in first row includes the IPO year in the first regime—the pre-IPO period. In the second row, the IPO year observations are excluded from both regimes due to its ambiguity in earnings management. The third row includes the IPO year in the second period. As the significance level shows, the two regimes are significantly different, consistent with earnings management. As an ancillary test (not reported here), the study also divides the pre- and post-IPO period into two sub-regimes with equal sample size respectively and tests the structural change. We find no significant structural difference in the pre- or post-IPO sub-regimes. Panel B examines structural change for the industry model. The statistical results show a significant structural change when the IPO year observations are excluded from the pre-IPO period. Both models show a significant structural change when the IPO year is excluded from the sample, consistent with earnings management.

Table 6   Structural Change Test

DA = α + β*t + ε. DA is estimated discretionary accruals. t is time index.			
Break Point	N	F Value	Pr > F
A. Discretionary accruals from Jones Model			
IPO year in period 1	814	5.81	0.0031
IPO year excluded	690	5.88	0.0029
IPO year in period 2	814	2.62	0.0736
B. Discretionary accruals from Industry Model			
IPO year in period 1	800	1.52	0.2085
IPO year excluded	678	2.89	0.0346
IPO year in period 2	800	3.62	0.0129

2. Dummy Variable Model

The Chow test is one approach to examine the difference in different regimes—pre- and post-IPO periods in this study. The discussion in Subsection 5.1 demonstrates a significant structural difference in the time series pattern (coefficients) of discretionary accruals prior to and after the IPO event. The test, however, doses not indicates the directions of the structural changes in the two regimes. This subsection provides tests whether the difference is consistent in direction with earnings management. A dummy variables is incorporated into the regression model to indicate the difference regimes:

$$DA = \alpha_0 + \alpha_1 + \beta *t + \beta_1 *d*t + \varepsilon,$$

where DA is discretionary accrual; d = 1 if t is in the post-IPO period. The fixed effect regression model allows different intercepts in the two periods (α_0 and α_1), which may reflect the underling economic difference for the two periods. The earnings management hypothesis predicts $\beta_1 < 0$. The estimated slope is β for the pre-IPO period and is ($\beta + \beta_1$) for the post-IPO period. The empirical results are presented in Table 7. In Panel A, for all the two models indicated below, the results show that discretionary accruals increases in t for the pre-IPO period ($\beta = 0.0163$, P-value < 0.01) and tend to decrease for the post-IPO period ($\beta_1 = -0.033$, P-value < 0.01; $\beta + \beta_1 = -0.017$). The negative sign in β_1 indicates a reversal in accruals and is consistent with earnings management. The industry model has similar result.

Since there is no particular models for these accrual items, the current study simply compares these items for the pre- and post-IPO periods. Panel B of Table 7 exhibits the mean difference between the two regimes and the following results are obtained. First, column (1) shows that change in bad debt is negative for the pre-IPO period and is positive for the post-IPO period (-0.0459, P-value < 0.01 vs. 0.0459, P-value = 0.12). In other words, bad debt decreases on the average for the pre-IPO period and increases for the post-IPO period. The evidence is consistent with the result in prior section that certain companies use discretionary accruals as a tool to enhance pre-IPO earnings. Second, column (2) provides evidence regarding depreciation expenses. As indicated in Table 5, IPO firms use depreciation expense as an income-decreasing tool for the pre-IPO period, possibly for tax reason. The estimated coefficient is negative and significant at 1% level. Column (3)

demonstrates a pattern that sales discount and return significantly increases for the post-IPO period. The increase in this variable appears to reflect an economic reality that competition drives down profit and firms have to offer sales discount and return to boost sales. The evidence is unable to support earnings management. Finally, column (4) provides evidence for R&D expenditure. As the coefficients show, the coefficient for R&D expenditure is significantly lower for the pre-IPO period at 5% level, consistent with earnings management.

Panel A of Table 7 provides evidence on the overall accrual. The evidence supports earnings management through accruals. Panel B provides evidence on individual accrual items. The results are somewhat inconclusive. For certain accruals, the tests show income-increasing earnings management—bad debt and R&D. Whereas certain accrual illustrates an income-decreasing earnings management—depreciation. Others are likely related to economic reality—sales discount and return. Given firms with a portfolio of discretionary accruals and their costs of earnings management differ, it is optimal for managers to trade off among the accruals. As a consequence, IPO firms choose one from another accrual to enhance reported earnings considering the relative cost and benefit of managing individual accruals.

Table 7   Time series of estimated coefficients

Panel A. The relation between discretionary accruals and time.
$DA = \alpha + \alpha_1 + \beta*t + \beta_1*d*t + \varepsilon$, where DA is estimated discretionary accruals; t is the integer year index, beginning from 1; d is equal to one for post-IPO years and zero otherwise (including IPO year).

Estimate	Jones Model	Industry
α	0.01731*	-0.02205**
α_1	0.01873	0.06159**
β	0.01628***	0.01027***
β_1	-0.03297***	-0.01672***

Panel B. Mean accrual items for pre- and post-IPO
Accrual items $= \alpha + \alpha_1*d + \varepsilon$, where d is equal to one for post-IPO years and equal to 0 for pre-IPO years.

	Bad debt ratio	Depreciation Ratio	Sales return & Discount ratio	(4)Research and Development
N	822	836	967	633
α	-0.0459**	0.0803***	0.0094***	0.015***
α_1	0.0459a	-0.0051***	0.0029***	0.005*

Note: ***, **, *: 0.01, 0.05 and 0.1 significance level. a: .12 significance level.   In panel B, only observations for years −3 to 4 are included in the regression and year 0 is excluded from regression.

Summary and Conclusion

This study investigates earnings management in the setting of initial public offerings with a sample of 127 TSE firms listing their shares over the 1986-1992 period. Instead of focusing on a particular year, this study examines the time series of relevant variables. Three approaches for testing earnings management are applied— the time series distribution of earnings and cash flows, the total accrual-based models and the time series of specific accruals. Several empirical results are obtained in support of the earnings management hypothesis. First, the time series of earnings and cash flows demonstrates an upward trend for the pre-IPO period and a downward trend for the post-IPO period in both variables, indicating earnings management for inflating reported earnings. Further analyses of the time series in the gap between these two variables and between mean and median statistics suggest that IPO firms enhance earnings through both real earnings management and accounting choices. Second, based on two accrual-based models, the time series of estimated discretionary accruals exhibit an income-increasing pattern for the pre-IPO years and an income-decreasing pattern for the post-IPO years, in further support of earnings management through discretionary accruals. The findings are further confirmed with the Chow tests and a dummy regression. Finally, tests on individual discretionary accruals such as bad debt, depreciation expenses, sales returns and discount, and research and development expenditure reveal somewhat "inconsistent" evidence with earnings management. The results suggest that an IPO firm does not use all discretionary accrual items to inflate earnings, possibly in consideration of the relative costs of a particular accounting manipulation. Instead, an IPO firm manages depreciation in an income-decreasing way, possibly for tax reason. This finding is consistent with the concept that firms manage discretionary accruals as a portfolio to minimize cost of earnings management.

A reliable detection of earnings management is difficult given the variety of incentives and the predictability in the behavior of nondiscretionary accruals. In addition to the empirical results, two important insights are obtained concerning the research design issue in the examination of earnings management. First, it is important that a researcher should identify the scenario and the related incentives for earnings management if powerful measures of earnings management are to be

obtained. Given a variety of accrual-based models, it is tempting for researchers to try the models and select a model that creates the "best" results. In particular, as mentioned in this study, in the setting of IPO, the DeAngelo model is likely to be a misspecified model of non-discretionary accruals. Second, it is equally important to incorporate the institutional arrangement specific to the research issue. For instance, an explicit formula is given as a reference for offering price in Taiwan. This is not the case in the US. Therefore, the patterns of earnings management are also expected to be different. Other research issues are also discussed in numerous studies (McNicholos, 2000; Thomas and Zhang, 2000).

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