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Earnings Quality and Valuation in IPOs *

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Abstract

Recent literatures provide evidence that IPOs are not necessarily “underpriced” with respect to their fair/intrinsic value. This paper examines what causes over- / under- valuation at the offer price by focusing on the effect of earnings quality and the role of institutional investors and underwriters in the pricing process. With an improved approach to estimate the value of IPO firms, we find that extent of overvaluation is positively associated with aggressive earnings management for IPOs during “the auction regime” , when the involvement of informed parties are limited, whereas such relationship is not observed for IPOs with book building where institutional investors and underwriters play a greater role in the pricing process.

Keyword : Initial public offerings, Valuation, Underpricing, Earnings management, IPO pricing process.

1 Introduction

It is well known that when companies go public, the first-day market price is generally substantially above the offer price at which investment banker sells stocks to investors, resulting in a large first day return. This first day return has been one of the most controversial issues in initial public offerings (IPOs) literature. Based on the assumption that market price reflects fair value in an efficient market, the increase of stock price on the first day of trading is taken as an evidence of “underpricing”¹. However, recent researches offer an alternative view of underpricing that issuers

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1 See Ibbotson et al. (1994), Ritter and Welch(2002),and Ljungqvist (2007) for the list of theories for underpricing.

underprice IPOs not necessarily with respect to the fair value. Purnanandam and Swaminathan (2004) examine this notion empirically and find that the U.S. IPOs are, on average, “over-priced” at the offer price relative to the valuation based on industry peer multiples.

This study attempts to explain what causes “over-/under- pricing” relative to fair/intrinsic value by investigating the effect of earnings quality and the role of institutional investors/underwriters in IPO pricing process. Specifically, we hypothesize that aggressive earnings management causes “offer price’s over-pricing” when the involvement of institutional investors and underwriters are limited whereas such relationship does not exist when they play a greater role in the pricing process.

IPO has been often cited as a typical occasion for which managers are strongly motivated to overstate earnings to sell stocks at an inflated price. Several studies document evidence consistent with this hypothesis (Friedlan, 1994; Teoh et al., 1998a; Teoh et al., 1998b; Ducharme et al., 2004), but more recent studies find that IPO firms, on average, manage earnings more conservatively (Fan, 2007; Ball and Shivakumar, 2008). The mixed results indicate that some managers inflate earnings around IPOs while others do not; the quality of reported earnings varies across IPO firms. Generally, aggressive earnings management deteriorates quality of earnings, which signifies valuation uncertainty about IPOs. Naturally, difference in the extent of earnings manipulation among IPO firms is potentially an important factor to explain why some firms are more “over- / under- priced” than others with respect to their fair/intrinsic value. At the same time, the ability and incentive to estimate and adjust for the valuation uncertainty related with earnings quality may depend on the investor type.

With a sample of 1,288 firms that went public in JASDAQ from 1989 to 2011, we estimate fair/intrinsic value of IPOs using price multiples of comparable firms, and find a significantly positive relationship between the extent of earnings management and “over-pricing” with respect to the fair/intrinsic value during “the auction regime”, when the involvement of institutional investors and the role of underwriters were limited². The results also suggest that earnings quality works as an important factor in determining offer price of IPOs with book building, where institutional investors/underwriters play a greater role in the pricing process. These results are consistent with the prior evidence that underpricing of book-building IPOs are significantly greater than those of auctions (Kaneko and Pettway, 2003; Kerins et al. 2007). The reason why auction IPOs experience lower underpricing may be attributed to the relatively uninformed individual investors’ tendency to “over-value” the IPOs with reported earnings inflated through earnings management.

This study makes several contributions to the literature. First, we introduce an improved

2 Kerins et al. (2007) discuss that during the auction regime, regulations and underwriter-imposed restrictions on bidding encouraged participation by individual investors, and institutional investors generally did not participate in the IPO market. They also refer to the underwriters’ comments on the popular press that the auction process could produce excessively high bids relative to “fair value.”

procedure to estimate fair/intrinsic value of IPO firms, by correcting the potential biases of the Purnanadam and Swaminathan (2004)'s methodology. In addition, this study provides evidence that aggressive earnings management tends to cause "over-valuation" when less informed individual investors dominate the pricing process without the involvement of institutional investors/underwriters.

The remainder of this study is organized as follows. Section 2 discusses the research design in the context of the related prior literatures. Section 3 presents sample and descriptive statistics. Section 4 reports the empirical results, and section 5 presents a summary and concluding remarks.

2 Research design

(1) Choosing comparable non-IPO industry peers to estimate fair/intrinsic value of IPOs

In the first step to estimate fair/intrinsic value using price multiple, we select an industry peer with comparable operating characteristics for each IPO firm in our sample. Our matching approach is similar in spirit to Purnanadam and Swaminathan (2004) who find a non-IPO industry peer with comparable sales and EBITDA profit margin, but ours is more simple and balanced between size and profitability. Purnanadam and Swaminathan (2004) group firms in each industry into three portfolios based on past sales and then split each sales-based portfolio into three portfolios based on past EBITDA profit margin. After matching each IPO to the appropriate industry-sales-EBITDA profit margin portfolio, they find a matching firm that is closest in sales to the IPO firm from the assigned portfolio. One concern about Purnanadam and Swaminathan (2004)'s method is to place too much emphasis on firm size, which sometimes results in choosing a firm that is different from the one we would choose with the equal emphasis on both size and profitability.³ Now, suppose IPO firm X has sales revenues of 102 and EBITDA profit margin of 18%, and there are two companies in the appropriate industry-sales-EBITDA margin portfolio; company A with sales revenues of 100 and EBITDA profit margin of 10%, and company B with sales revenues of 105 and EBITDA profit margin of 20%. In this case, company B seems more comparable to firm X when both metrics are considered. However, in fact, company A is selected with Purnanadam and Swaminathan (2004)'s method, as company A's sales revenues is closer to firm X than company B, although it is not clear whether company size is a dominant factor for valuing IPO firm. To avoid this bias, we apply the

3 Zheng (2007) indicates that in Purnanadam and Swaminathan (2004)'s method biases are possible in the three areas; inclusion of new primary shares, cash holdings, and capital structure regarding the valuation method, but does not mention the bias in choosing matching firms. As described in the later section, we consider the possible bias related with the difference in capital structure when we estimate fair/intrinsic value.

following approach to select a matching firm for each IPO firm.

We first consider all publicly traded firms in Japanese market whose data are available for the fiscal year prior to the IPO year. After eliminating those firms that went public during the past three years, we group firms into industry portfolio using the five-digit Nikkei industry code. Then, from the appropriate industry portfolio, we choose a firm that is closest in size and profitability to IPO firm. More specifically, we select industry peer with minimum total of squared deviation of sales revenues and EBITDA profit margin: $((\text{Sales}_{\text{Match}} - \text{Sales}_{\text{IPO}}) / \text{Sales}_{\text{IPO}})^2 + ((\text{EBITDA profit margin}_{\text{Match}} - \text{EBITDA profit margin}_{\text{IPO}}) / \text{EBITDA profit margin}_{\text{IPO}})^2$, where $\text{Sales}_{\text{Match}}$ is matching firm's sales revenues, and $\text{Sales}_{\text{IPO}}$ is IPO firm's sales revenues; likewise $\text{EBITDA profit margin}_{\text{Match}}$ is matching firm's EBITDA profit margin, and $\text{EBITDA profit margin}_{\text{IPO}}$ is IPO firm's EBITDA profit margin. If stock price data prior to the IPO date is not available for the selected firm, then we work over the same selection process and find a firm with the second smallest sum of squared deviation of sales revenues and EBITDA profit margin⁴. During the matching process, we do not restrict the same matching firm from being chosen as a matching firm for other IPO firm.

(2) IPO valuation using comparable firm's price multiple⁵

We estimate fair/intrinsic value for each IPO firm based on the matching firm's price multiples; enterprise value to sales multiple and enterprise value to EBITDA multiple. Purnanandam and Swaminathan (2004) use price to sales and price to EBITDA, however we also include value of debts to avoid possible bias related with capital structure suggested by prior literatures (Kim and Ritter, 1999; Zheng, 2007). Consequently, the fair/intrinsic value (Enterprise Value: EV) for IPO firms in this study is computed as follows:

$$EV_{\text{SALES}} = ((\text{Matching firm's stock price} \times \text{shares outstanding} + \text{book value of total debts}) / \text{Matching firm's prior fiscal year sales revenues}) \times \text{IPO firm's prior fiscal year sales revenues},$$

$$EV_{\text{EBITDA}} = ((\text{Matching firm's stock price} \times \text{shares outstanding} + \text{book value of total debts}) / \text{Matching firm's prior fiscal year EBITDA}) \times \text{IPO firm's prior fiscal year EBITDA}.$$

Based on the computed fair/intrinsic enterprise value, we calculate the offer price P/V ratios of IPO firms as:

4 We allow those firms being selected as matching firms that lack closing stock price of the day immediately prior to the IPO offer date but at least have closing price 5 days before the offer date.

5 Although discounted cash flow (DCF) method is widely used for valuation, we use industry peer's price multiple for several reasons: comparability to prior researches including Purnanandam and Swaminathan (2004) and Kim and Ritter (1999), difficulties to estimate future cash flow and/or appropriate discount rate for pre-IPO firms due to the information restriction, and the fact that practitioners mainly use price multiple for valuing IPOs (Roosenboom, 2012).

$$P/V_{\text{SALES}} = (\text{Offer price} \times \text{total shares outstanding at the offer date} + \text{book value of total debts}) / \text{EV}_{\text{SALES}}$$

$$P/V_{\text{EBITDA}} = (\text{Offer price} \times \text{total shares outstanding at the offer date} + \text{book value of total debts}) / \text{EV}_{\text{EBITDA}}.^6$$

By definition, if an IPO firm's P/V is more (less) than one, the offer price of this firm is considered as over-valued (under-valued) compared to its industry peer.

(3) Measuring earnings quality

As a measure for earnings quality, this study uses three variables; total accruals (ACC), abnormal accruals (AAC), and sign changes between operating cash flows and net income (Sign Change). ACC is calculated as change in non-cash current assets minus change in current liabilities plus change in debt included in current liabilities minus depreciation and amortization. Abnormal accruals are the unexpected portion of total accruals; we estimate AAC as total accruals minus industry peer's total accruals (matched comparable firm's total accruals). ACC and AAC are both scaled by total assets. We assume that higher accruals (both ACC and AAC) represent lower earnings quality. We use AAC as the main variable for a proxy of earnings quality, as AAC is excess amount of accruals over "normal" amount of accruals that a comparable firm without a specific incentive to manage earnings has and considered as better indication of the degree of earnings management.

Although accruals are widely used measure of earnings management, this study additionally uses Sign Change as another proxy measure for earnings management. As suggested by Yoon and Miller (2002), it is natural to find positive (negative) operating cash flows for firms reporting positive (negative) net income under normal circumstances, therefore, it is likely that firms with negative operating cash-flows and positive net income engage in aggressive earnings management. We use Sign Change as an indication of lower quality of earnings.

3 Sample and descriptive statistics

(1) Sample selection

An initial sample consists of firms that went public in JASDAQ between 1989 and 2011. It enables us to investigate the difference between auction IPOs and book building IPOs because auction-pricing method was used for firms that went public between 1989 and the end of August

6 Alternatively, as is the description of P/V ratios in Purnanandam and Swaminathan (2004), offer price P/V ratios: P/V_{SALES} , P/V_{EBITDA} , P/V_{Earnings} are expressed as, $(\text{EV}/\text{Sales})_{\text{IPO}} / (\text{EV}/\text{Sales})_{\text{Match}}$, and $(\text{EV}/\text{EBITDA})_{\text{IPO}} / (\text{EV}/\text{EBITDA})_{\text{Match}}$, respectively.

1997 in Japan, whereas most IPO firms use book building after September 1997 when book building became available. The IPO data is collected from JASDAQ Market Annual Statistics, Equity Issue Whitepaper provided by Shoji-homu, IPO Whitepaper provided by Research Group for Disclosure. We exclude the firms whose financial data in the period three years before going public are not available on the Nikkei NEEDS financial QUEST database. Also, banks, securities firms, and insurance firms are excluded to avoid regulation-related distortion. Consequently, a total of 1,288 firms is identified.

(2) Descriptive statistics

Table 1 presents the descriptive statistics. Panel A reports sales revenues, EBITDA profit margin, prior period sales growth, net income, accruals, and debt to total assets ratio (leverage). Descriptive statistics show that matching firms have quite similar size of sales revenues, EBITDA profit margin to IPO firms, suggesting that our matching approach in general successfully identifies appropriate comparable firm to IPO firm. On the other hand, IPO firms tend to have higher growth, larger net income, and more reliant on debt compared to their industry peer.

Panel B reports the descriptive statistics of matching firms' price multiples (enterprise value to sales multiple and enterprise value to EBITDA multiple) across markets where matching firms are listed. SME boards category includes JASDAQ, HERCURES, and TSE MOTHERS; other stock

Table 1. Descriptive statistics

Panel A. Characteristics of IPO firms and matching firms

	IPO firms				Matching firms			
	Mean	25%	Median	75%	Mean	25%	Median	75%
Sales revenues	18324	5834	10780	20908	18238	6010	11239	21491
EBITDA profit margin	0.117	0.061	0.097	0.154	0.108	0.059	0.093	0.138
Sales growth	0.165	0.033	0.105	0.209	0.026	-0.047	0.017	0.087
Net income	534	201	320	555	285	88	230	484
Accruals	-0.015	-0.063	-0.020	0.026	-0.020	-0.053	-0.024	0.010
Leverage	0.634	0.519	0.654	0.772	0.511	0.329	0.496	0.663

Sale revenues and net income are in 1 million yen. Accruals are computed as change in non-cash current assets minus change in current liabilities plus change in debt included in current liabilities minus depreciation and amortization. Leverage is debt to total assets ratio.

Panel B. Matching firms listing market and price multiple

	$(EV/Sales)_{Match}$				$(EV/EBITDA)_{Match}$			
	25%	Median	75%	N	25%	Median	75%	N
SME boards	0.890	1.286	2.082	584	10.466	15.290	22.848	581
Main boards	0.994	1.522	2.535	681	12.935	18.017	25.595	678

SME (stock exchanges dedicated for trading the shares of small and medium scale enterprises: SMEs) boards include JASDAQ, HERCURES, and TSE MOTHERS; others are included in Main boards.

$(EV/Sales)_{Match}$, $(EV/EBITDA)_{Match}$, are $((\text{Matching firm's market price} \times \text{shares outstanding} + \text{total debt}) / \text{Matching firm's prior fiscal year sales revenues})$, $((\text{Matching firm's market price} \times \text{shares outstanding}) / \text{Matching firm's prior fiscal year EBITDA})$. All variables deviating from the mean by more than three times the standard deviation are excluded in order to avoid extreme value affecting the validity of results; this process decreases sample size to 1,265 for P/V_{Sales} , and 1,259 for P/V_{EBITDA} .

exchanges are included in the main board category.⁷ Panel B indicates any price multiples of the main boards is higher than those of the SME boards; for example, median sales-based multiple of the main boards is 1.522 whereas that of SME boards is 1.286. This suggests that when other things being equal, investors tend to pay more for a firm in main boards compared to a firm listed in SME boards. Coupled with the fact that 52%-54% of matching firms are from the main boards, the difference in price multiple across boards may cause upward bias in the estimated fair/intrinsic value of IPOs matched on main board listing firms.

Table 2. Median P/V ratios by calendar year and pricing method

	P/V _{Sales}				P/V _{EBITDA}			
	25%	Median	75%	N	25%	Median	75%	N
1989	0.783	1.072	1.678	42	0.712	0.948	1.181	42
1990	0.822	1.139	1.675	60	0.696	0.960	1.324	61
1991	0.816	1.058	1.363	66	0.811	0.988	1.241	66
1992	0.717	0.945	1.559	13	0.677	0.944	1.655	13
1993	0.742	1.079	1.379	48	0.708	1.026	1.356	48
1994	0.810	1.114	1.520	99	0.779	1.068	1.448	100
1995	0.570	0.891	1.171	123	0.563	0.853	1.077	122
1996	0.684	1.001	1.393	93	0.705	0.967	1.384	91
1997	0.578	0.816	1.155	91	0.534	0.770	1.123	91
1998	0.665	0.907	1.403	49	0.649	0.802	1.297	49
1999	0.898	1.312	1.712	59	0.891	1.186	1.586	58
2000	0.499	0.928	1.466	85	0.447	0.830	1.288	83
2001	0.632	0.978	1.409	79	0.582	0.902	1.571	80
2002	0.589	0.775	1.170	53	0.530	0.722	1.135	53
2003	0.614	1.030	1.450	55	0.557	1.017	1.449	54
2004	0.703	0.967	1.614	65	0.740	1.006	1.442	65
2005	0.476	0.939	1.251	58	0.544	0.926	1.238	58
2006	0.594	0.817	1.212	47	0.602	0.784	1.172	47
2007	0.585	0.767	0.991	40	0.530	0.765	0.964	39
2008	0.570	0.697	0.837	14	0.550	0.694	0.833	14
2009	0.872	1.114	1.337	5	0.985	1.152	1.159	5
2010	0.952	1.014	1.323	8	0.939	1.040	1.168	8
2011	0.502	0.696	0.987	13	0.366	0.600	0.866	12
Auction	0.705	1.004	1.379	612	0.689	0.935	1.246	611
Book building	0.603	0.918	1.372	653	0.562	0.885	1.299	648
ALL	0.651	0.947	1.379	1265	0.628	0.904	1.278	1259

Prefers to the enterprise value consisting of offer price based equity value and book value of debt and V is the fair/intrinsic value based on comparable firm multiples; V_{sales} is the fair/intrinsic value based on comparable firm price to sales ratio (PSR). V_{EBITDA} is the fair/intrinsic value based on comparable firm price to EBITDA ratio. All variables deviating from the mean by more than three times the standard deviation are excluded in order to avoid extreme value affecting the validity of results; this process decreases sample size to 1,265 for P/V_{Sales}, 1,259 for P/V_{EBITDA}.

7 More specifically, over 95% of firms in SME boards category consists of JASDAQ firms, and more than 85% of firms in main boards category consists of Tokyo Stock Exchange and Osaka Stock Exchange (two major Japanese stock exchanges) firms.

Table 2 presents the 25th, 50th, and 75th percentiles of P/V ratios based on EV/Sales, and EV/EBITDA multiple by calendar year and pricing method. All variables deviating from the mean by more than three times the standard deviation are excluded in order to avoid extreme value affecting the validity of results; this process decreases sample size to 1,265 for P/V_{Sales} , and 1,259 for P/V_{EBITDA} . The median of P/V ratios in ALL are below 1, and the results of Wilcoxon rank sum test for testing the null hypothesis that the median P/V is equal to 1 indicate P/V_{EBITDA} is significantly lower than 1 (not tabulated). Nevertheless, distribution of P/V ratios both within and across years indicate that a considerable number of IPOs are “over-valued” at the offer price; for example, median value of 75th percentile P/V_{Sales} and P/V_{EBITDA} are 1.379 and 1.278. These “offer-price’s over-pricing” may be caused by the lower quality of earnings. Also, both median values of P/V_{Sales} and P/V_{EBITDA} of auction IPOs (1.004 and 0.935, respectively) are larger than those of book building IPOs (0.918 and 0.885, respectively). These findings are consistent with our basic expectation that aggressive earnings management causes “over-valuation” with respect to fair/intrinsic value especially during the auction regime when the participation of institutional investors and the role of underwriters were limited.

4 Empirical results

We group our empirical results into two main sections. In the first section (Table 3), we use univariate analysis to investigate the relationship between earnings quality and “over- and under-pricing” relative to fair/intrinsic value. In the second section (Tables 4-5), we apply multivariate regressions to test the significance of earnings quality in explaining the “over- and under-pricing” relative to fair/intrinsic value. In this analysis, we conduct regressions separately for firms that went public during the auction regime and for firms that went public with book building to test whether and how the greater involvement of institutional investors (and underwriters) in the pricing process affects the association between the quality of earnings and offer price. As indicated in prior studies that institutional investors generally did not participate in the IPO market due to the requirements during the auction regime whereas institutional investors are more involved in book building IPOs (Kaneko and Pettway, 2003; Kerins et al, 2007), we expect earnings quality variables to have significantly positive coefficients over P/V ratios during the auction regime whereas not so for the book building IPOs.

(1) Earnings quality and “over-/under- valuation” with respect to the fair/intrinsic value

In this section, we examine whether and how earnings quality affects “over- and under-pricing” with respect to fair/intrinsic value. We use three variables as the proxy for earnings quality, and make three different quintile portfolios based on these earnings quality variables. Table 3 compares the median values of offer price P/V ratio of firms with relatively higher quality of earnings (firms with low ACC, low AAC, or No Sign Change) and those of firms with lower quality of earnings (firms with high ACC, high AAC, or Sign Change).

Table 3. Earnings quality and P/V ratios (offer price)

Panel A. P/V ratios across accruals quintile

	Accruals based quintile					Difference test High-Low	Wilcoxon Z-value
	Low	2	3	4	High		
P/V _{Sales}	0.939	0.925	0.918	1.019	0.967	0.028	1.323
P/V _{EBITDA}	0.885	0.900	0.884	0.962	0.956	0.071	1.590

Panel B. P/V ratios across abnormal accruals quintile

	Abnormal accruals based quintile					Difference test High-Low	Wilcoxon Z-value
	Low	2	3	4	High		
P/V _{Sales}	0.881	0.936	1.022	0.927	0.998	0.117	2.198**
P/V _{EBITDA}	0.843	0.914	0.962	0.883	0.956	0.113	2.730***

Panel C. Median P/V ratios of firms with and without sign change

	No-Sign Change	Sign Change	Difference test		Wilcoxon Z-value
			Sign Change — No-Sign Change		
P/V _{Sales}	0.945	0.973	0.028		1.027
P/V _{EBITDA}	0.903	0.969	0.066		1.650*

Abnormal accruals are estimated as a residual portion of accruals after subtracting the matched pair firm's accruals. Sign Change subsample consist of firms with negative operating cash flows and positive net income, and other firms are included in No-Sign Change subsample.

P refers to the enterprise value consisting of offer price based equity value and book value of debts and V is the intrinsic value based on comparable firm multiples; V_{Sales} is the intrinsic value based on comparable firm enterprise value to sales ratio. V_{EBITDA} is the intrinsic value based on comparable firm enterprise value to EBITDA ratio. All reported numbers are median values. Wilcoxon p-value is for Wilcoxon rank sum test for the difference between firms with high accruals (or Sign Change) and firms with low accruals (or No-Sign Change). The notations *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A reports the results with the accruals based quintile portfolio. Both sales-based P/V ratio and EBITDA-based P/V ratio of high accruals firms exceed those of low accruals firms, but the difference is not statistically significant. Panel B reports the results with the abnormal accruals-based quintile portfolio. Sales-based P/V ratio and EBITDA-based P/V ratio of high abnormal accruals firms exceed those of low abnormal accruals firms, and the difference is statistically significant at the 5% and 1%, respectively. Panel C reports P/V ratios of firms with negative operating cash flows and positive net income (Sign Change), and those of other firms (No-Sign Change), and shows the similar tendency. Both P/V ratios of Sign Change firms are higher than those of No-Sign Change firms. These results are consistent with our prediction that the offer price of IPOs with lower quality of earnings tend to be “over-valued” with respect to fair/intrinsic value.

(2) Multivariate analysis

In this section, we conduct multivariate regression analysis to examine the impact of earnings management on P/V ratio, while controlling for other variables factors that would affect over-/under-valuation :

$$P/V_{EBITDA} = \alpha + \beta_1 \text{Earnings Quality} + \beta_2 \text{Growth} + \beta_3 \text{Log Sales} + \beta_4 \text{Log Age} + \beta_5 D_{\text{Market}} + \beta_6 \text{Shareoffer} + \varepsilon. \quad (1)$$

We use P/V_{EBITDA} as dependent variable because prior researches mainly use EBITDA-based P/V ratios because valuations based on sales based multiples tend to be less accurate (Liu et al.,2002; Purnanadam and Swaminathan,2004). Earnings Quality takes one of the four variables in each regression: ACC, AAC, ACC.10, or SIGNCH. ACC is total accruals and AAC is abnormal accruals. ACC.10 is decile rank based on total accruals. SIGNCH is an indicator variable that equals 1 if a firm with negative operating cash flows reports positive net income, and 0 otherwise. Earnings quality variable is the key variable that captures the degree of earnings management, i.e., the larger ACC, AAC, and ACC.10, the lower earnings quality; SIGNCH represents lower quality of earnings. Lower quality of earnings is related with valuation uncertainty about IPO firm, and thus could lead to over-valuation with respect to fair/intrinsic value if investors fail to require discount for such firms. Therefore, the predicted sign is positive for auction IPOs, whereas we expect those for book building IPOs to be insignificant (or negative).

Log Sales is the natural logarithm of sales revenues prior to going public, which controls for the valuation uncertainty and information asymmetry. Growth is sales growth rate prior to going public, and Log Age is the natural logarithm of the number of months until the date of going public from the initiation. Growth and Log Age are included to control for the growth premium. As IPO firms are supposed to have higher growth potential than their industry peers, IPO firms may have price premium. D_{market} is an indicator variable that equals 1 if the matching firm is from main boards, and 0 otherwise. D_{market} is included because price multiples of firms listing in main boards tend to be higher than those of SME boards as shown in Table 2, and this may negatively affect P/V ratios. Shareoffer is the proportion of secondary shares offered in IPOs, and this variable could affect the issuer's incentive for price negotiation (Habib and Ljungqvist, 2001). Year dummy is also included to control for the market wide factor.

Table 4 shows the results. The variables of our primary interest are ACC, AAC, ACC.10 and SIGNCH. In Panel A, which reports the results of IPOs with auction, ACC, AAC, and ACC.10 have significantly positive coefficients, suggesting that IPOs with lower quality of earnings are more likely to be “over-priced” with respect to fair/intrinsic value during the auction regime. On the other hand, when conducting same regression with firms that went public with book building, all the coefficients of earnings quality variables become insignificant (Panel B). Meanwhile, other variables such as Growth, Log Age, D market have consistent and statistically significant coefficients in the way we expect.

Overall, regression results are consistent with our prediction and suggest that greater participation of individual investors and less involvement of institutional investors/ underwriters in the pricing process may cause “offer price's over-pricing” due to the individual investors' insufficient ability to detect earnings management and to claim risk premium for IPO firms with lower quality of earnings.⁸

Table 4. Regression of the impact of earnings management on offer price P/V ratio based on EBITDA (Dependent variable: P/V_{EBITDA})

Panel A. Auction (N=611)

Independent variable	coefficient	t-value	coefficient	t-value	coefficient	t-value	coefficient	t-value
ACC	0.494	1.730 *						
AAC			0.384	2.830 ***				
ACC.10					0.018	2.207 **		
SIGNCH							0.047	0.783
Growth	0.265	2.366 **	0.271	2.434 **	0.267	2.397 **	0.275	2.458 **
Log Sales	0.066	2.463 **	0.061	2.261 **	0.066	2.478 **	0.065	2.415 **
Log Age	-0.128	-2.768 ***	-0.124	-2.702 ***	-0.126	-2.738 ***	-0.127	-2.738 ***
D _{market}	-0.091	-1.906 *	-0.098	-2.061 **	-0.093	-1.947 *	-0.095	-1.984 **
Shareoffer	-0.076	-0.628	-0.073	-0.606	-0.088	-0.729	-0.084	-0.689
Adj.R2	0.040		0.048		0.043		0.037	
F-statistic	5.271		6.147		5.600		4.856	

Panel B. Book building (N=648)

Independent variable	coefficient	t-value	coefficient	t-value	coefficient	t-value	coefficient	t-value
ACC	0.189	0.783						
AAC			0.265	1.374				
ACC.10					0.012	1.314		
SIGNCH							0.081	1.111
Growth	0.237	2.334 **	0.246	2.417 **	0.240	2.365 **	0.233	2.298 **
Log Sales	0.046	1.539	0.047	1.568	0.047	1.563	0.046	1.527
Log Age	-0.169	-3.745 ***	-0.167	-3.702 ***	-0.169	-3.758 ***	-0.167	-3.705 ***
D _{market}	-0.086	-1.498	-0.088	-1.533	-0.088	-1.520	-0.087	-1.507
Shareoffer	-0.181	-1.347	-0.185	-1.379	-0.181	-1.349	-0.177	-1.320
Adj.R2	0.064		0.066		0.066		0.065	
F-statistic	7.338		7.534		7.510		7.434	

The dependent variable P/V_{EBITDA} is the ratio of the enterprise value consisting of offer price based equity value and book value of debt to the intrinsic value based on comparable firm enterprise value to EBITDA multiples. ACC is total accruals and AAC is abnormal accruals, which is estimated as a residual portion of total accruals after subtracting the matched pair firm's total accruals. ACC and AAC are both deflated by total assets. ACC.10 is decile rank based on total accruals. SIGNCH is an indicator variable that equals 1 if a firm with negative operating cash flows reports positive net income and 0 otherwise. Log Age is the natural logarithm of the number of months until the date of going public from the initiation. GROWTH is sales growth rate prior to going public. Log Sales is the natural logarithm of sales revenues prior to going public. D_{market} is an indicator variable that equals 1 if the matching firm is from main boards, and 0 otherwise. Shareoffer is the proportion of secondary shares offered in IPOs. Year dummy is also included to control for the market wide factor (not tabulated). The notations *, **, and *** denote the statistical significance at the 10%, 5%, and 1% levels, respectively.

(3) Tendency for aggressive earnings management and the pricing method

So far, we have the results consistent with our prediction that aggressive earnings management

8 For robustness check, we additionally conduct the same regression using the natural logarithm of offer price P/V_{EBITDA} and percentile rank of P/V_{EBITDA} instead of P/V_{EBITDA} as dependent variable. The results are consistent with the results in Table 4, and further confirm our earlier findings (not tabulated).

Table 5. Difference in earnings management between auction and book building IPOs.

Panel A. Accrual				
	Mean	25%	Median	75%
Auction IPOs (N=611)	-0.015	-0.053	-0.017	0.022
Book building IPOs (N=648)	-0.017	-0.070	-0.024	0.028
Difference test				
Auction - Book building			0.007	
	Wilcoxon Z-value		1.426	
	p-value		0.154	
Panel B. Abnormal Accrual				
	Mean	25%	Median	75%
Auction IPOs (N=611)	-0.001	-0.053	0.004	0.059
Book building IPOs (N=648)	0.009	-0.067	0.001	0.068
Difference test				
Auction - Book building			0.003	
	Wilcoxon Z-value		0.394	
	p-value		0.694	
Panel C. Sign Change				
	Sign change			
Auction IPOs (N=611)	15.22%			
Book building IPOs (N=648)	16.05%			
Difference test				
Auction - Book building	-0.83%			
	χ squared	-0.404		
	p-value	0.686		

Abnormal accruals is estimated as a residual portion of total accruals after subtracting the matched pair firm's total accruals. Accruals and abnormal accruals are both deflated by total assets. Sign Change subsample consist of firms with negative operating cash flows and positive net income, and other firms are included in No-Sign Change subsample.

is positively related with “over-valuation” for IPOs in the auction regime, while not so for book building IPOs. We attribute these associations to the little (significant) involvement of institutional investors/underwriters in the pricing process of auction (book building) IPOs. However, it may simply reflect more (less) earnings management for auction (book building) IPOs. To investigate this possibility, we examine whether the quality of earnings is lower for auction IPOs compared to book building IPOs. The results in Table 5 show that there are no significant difference in the quality of earnings between auction IPOs and book building IPOs. Therefore, the results in above section are not attributed to the underlying difference in earnings quality and support our findings.

5 Summary and Conclusion

Recent literatures provide evidence that IPOs are not necessarily “underpriced” with respect to their fair/intrinsic value, however the question of why IPOs are “overpriced” has been largely

left unexamined. This study seeks to explain what causes “offer price’s over-pricing” relative to the fair/intrinsic value by investigating the effect of earnings quality and the role of institutional investors in IPO pricing process. Specifically, we hypothesize that aggressive earnings management causes “offer price’s over-pricing” when the involvement of institutional investors/underwriters are limited whereas not so when they play a greater role in the pricing process. With an improved approach to estimate the fair/intrinsic value of JASDAQ IPOs, we find that “offer price’s over-pricing” tendency is positively associated with aggressive earnings management for IPOs during the auction regime when relatively uninformed individual investors dominate the pricing process, whereas such relationship is not observed for IPOs with book building where institutional investors/ underwriters play a greater role. These results are also consistent with the prior evidence that underpricing of book-building IPOs are significantly greater than those of auctions. The reason why IPOs during the auction regime experience lower underpricing may be attributed to the relatively uninformed individual investors’ tendency to “over-value” the IPOs with inflated earnings through earnings management.

Although we have consistent results supporting our prediction, these results may potentially suffer from biases related with our fair/intrinsic value estimation procedure. Further studies introducing improved methods for valuation of IPOs, especially those with better control of growth factors will benefit the ongoing arguments about whether IPOs are over-/under-valued.

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