Internet Appendix B for Pre-Market Trading and IPO Pricing: The Post-Sample Period

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Table IB-1: Firm characteristics

The sample includes 172 Taiwanese firms that conducted IPOs during 3/2011-12/2014. NT$ refers to New Taiwan Dollars. All NT$ values are deflated to constant year 2014 NT$ based on Taiwan's CPI index. The exchange rate at the end of year 2014 is US$1 = NT$31.60. *Debt ratio* is total liabilities over assets. *Return on assets* is annual net earnings relative to assets. We use paired *t*-test for differences in means, and Wilcoxon signed rank test for differences in medians. We do not test the significance of the change in firm age since the value of this variable increases by construction. ***, **, and * denote the difference is significant at the 1%, 5%, and 10% levels, respectively.

Panel A: When starting trading on the Emerging Stock Market.

Variables	N	Mean	Median	Std. Dev	Min.	Max.
Firm Age (years)	172	13.55	10.87	9.71	0.63	51.69
Assets (millions of NT$)	172	4335.22	819.50	34260.51	67.80	448756.09
Annual revenues (millions of NT$)	172	2540.14	637.93	11310.80	0.00	141911.00
Debt ratio (%)	172	49.03	42.62	101.84	0.00	1352.29
Return on Assets (%)	172	5.41	7.10	14.63	-78.98	50.61
% of firms with VC backing	172	56.40				

Panel B: At the time of IPO application

Variables	N	Mean	Median	Std. Dev	Min.	Max.
Firm Age (years)	172	16.15	13.46	9.97	1.66	60.49
Assets (millions of NT$)	172	5774.67	1278.19	39222.18	213.22	508715.14
Revenues (millions of NT$)	172	3053.62	1082.34	9169.49	0.76	103520.65
Debt ratio (%)	172	38.92	37.86	18.77	1.68	97.64
Return on Assets (%)	172	8.67	8.91	10.83	-47.38	45.06
% of firms with VC backing	172	58.14				

Panel C: Difference (Panel B – Panel A)

	Mean	Median
Firm Age (years)	2.60**	2.59***
Assets (millions of NT$)	1439.45	458.69***
Revenues (millions of NT$)	513.48	444.41***
Debt ratio (%)	-10.10	-4.76
Return on assets (%)	3.26**	1.82**

Table IB-2: IPO characteristics

The sample includes 172 firms that issued IPOs during 3/2011-12/2014. *% of shares issued* is the shares offered in the IPO relative to the number of shares outstanding before the IPO. *P/E* is the IPO offer price relative to the last annual earnings per share by the time of IPO. *Price revision* is the offer price relative to the midpoint of the initial price range, minus one. *Price discount* is one minus the ratio of the offer price over the closing price on the pre-pricing day on the ESM. *Price discount based on regulatory benchmark* is one minus the ratio of the offer price over the average ESM trading price during 10 days before the bookbuilding announcement is submitted to Taiwan Securities Association. *Expected initial return* is the ratio of the closing price on the pre-pricing day on the ESM over the IPO offer price minus one. *Initial return* is the ratio of first trading day closing price over the IPO offer price minus one. In Panel B, the 2011 number of IPOs are part-year totals. TWSE is the Taiwan Stock Exchange, and GTSM is the Gre Tai Securities Market. The mean initial returns are equally weighted. *Post-issue market cap* equals shares outstanding after the issuance times either the offer price or the closing price on the first trading day on TWSE or GTSM. All NT$ values are deflated to constant year 2014 NT$ based on Taiwan's CPI index.

Panel A: IPO characteristics

Variables	N	Mean	Median	Std. Dev	Min.	Max.
IPO Proceeds (NT$, millions)	172	322.26	200.08	394.70	26.22	2939.40
% of shares issued	172	11.87	10.86	10.13	0.64	135.35
% of IPOs on TWSE	172	32.56				
P/E	172	21.03	14.48	31.36	-43.37	318.47
Price revision	172	-1.59	-1.53	4.46	-20.48	9.09
Price discount (%)	172	23.01	21.88	8.24	-5.26	50.08
Price discount based on Regulatory benchmark (%)	172	22.73	23.44	5.42	5.66	30.00
Expected initial return (%)	172	31.51	28.00	15.55	-5.00	100.33
Initial return (%)	172	26.79	22.52	27.44	-18.49	204.76
Percentage with negative initial returns (%)	172	9.30				
Post-issue market cap (NT$, millions)						
at offer price	172	4274.51	2332.45	5945.74	338.29	40658.60
at first closing market price	172	5347.73	2920.50	7742.56	511.00	58674.00

Panel B: Initial returns by year

	All		TWSE		GTSM	
	N	IR, %	N	IR, %	N	IR, %
2011	46	11.88	17	4.66	29	16.11
2012	48	31.19	11	31.39	37	31.14
2013	45	36.73	19	26.65	26	44.09
2014	33	27.63	9	31.58	24	26.15
All	172	26.79	50	21.70	116	29.25

Table IB-3: Price Accuracy

Price error is the ratio of the pre-IPO price on ESM over the closing price on the first trading day on TWSE or GTSM, minus one. *Price inaccuracy* is the absolute value of price error. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Variables	N	Mean	Median	Std Dev	Min.	Max.
Price inaccuracy (%):						
6 months before pricing	172	37.17***	28.37***	33.29	0.00	176.66
6 month before pricing (after apply IPO)	45	48.98***	35.40***	47.74	0.00	176.66
3 months before pricing	172	25.49***	21.08***	21.24	0.16	139.09
2 months before pricing	172	21.88***	16.27***	18.32	0.11	127.98
1 month before pricing	172	18.53***	14.93***	13.92	0.00	69.31
the day before pricing	172	12.74***	10.38***	10.20	0.13	71.63
4th day after pricing	172	9.92***	8.14***	8.17	0.00	43.75
Price error (%):						
6 months before pricing	172	4.52	-9.42	49.78	-68.25	176.66
6 month before pricing (after apply IPO)	45	24.57**	-0.93	64.15	-59.62	176.66
3 months before pricing	172	2.47	-2.60	33.14	-59.71	139.09
2 months before pricing	172	4.43**	4.45	28.24	-58.75	127.98
1 month before pricing	172	4.99***	6.90***	22.67	-60.94	69.31
the day before pricing	172	6.21***	6.50***	15.11	-42.19	71.63
4th day after pricing	172	4.68***	5.03***	11.99	-43.75	43.26

Table IB-4: Predictability of Initial Returns

The dependent variable is *Initial return,* which is the ratio of first trading day closing price over the IPO offer price minus one. *Expected initial return* is the ratio of the closing price on the pre-pricing day on the ESM over the offer price minus one. *Price revision* is the offer price relative to the midpoint of the initial price range, minus one. *Positive price revision* equals price revision if it is positive and zero otherwise. *Market return* is the three-week value-weighted return of all stocks on TWSE and GTSM prior to the IPO pricing. *Volatility* is the standard deviation of daily stock returns during the 3 months prior to IPO pricing. *VC dummy* equals to 1 if the firm is backed by venture capital and zero otherwise. *Return on assets* is annual earnings relative to assets. *t*-statistics are adjusted for heteroskedasticity. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

Model	(1)		(2)		(3)	
Variables	Estimates	t-value	Estimates	t-value	Estimates	t-value
Expected initial return	1.20	(6.42)***			1.06	(6.32)***
Price revision			0.20	(0.37)	0.79	(1.28)
Positive Price revision			-0.14	(-0.12)	-0.59	(-0.48)
Market return			3.19	(3.92)***	1.21	(1.79)*
Volatility					0.15	(0.12)
VC dummy					-0.11	(-0.03)
Return on assets					0.19	(1.47)
Ln(assets)					-1.00	(-0.61)
Intercept	-10.86	(-2.13)**	27.07	(10.70)***		
Industry dummies					yes	
Year dummies					yes	
R^2	0.4586		0.1904		0.5856	
N	172		172		172	

Table IB-5: Determinants of Pre-Market Price Accuracy

The dependent variable is the percentage price inaccuracy on the pre-pricing day, i.e., the absolute value of the ratio of the closing price on the pre-pricing day on the ESM over the closing price on the first trading day on the TWSE or GTSM, minus one, multiplied by 100. *%Zero trading* is the percentage of trading days with no trading during the 3 months prior to IPO pricing. *%Zero return* is the percentage of trading days with zero stock return or no trading during the 3 months prior to IPO pricing. *Amihud ratio* is daily average of the absolute value of stock return over dollar trading volume during the 3 months prior to IPO pricing. *Volatility* is the standard deviation of daily stock returns during the 3 months prior to IPO pricing. *VC dummy* equals to 1 if the firm is backed by venture capital and zero otherwise. *Return on assets* is annual earnings relative to assets. *t*-statistics are adjusted for heteroskedasticity. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

Model	(1)		(2)		(3)		(4)		(5)		(6)	
Variables	Estimates	t-value	Estimates	t-value	Estimates	t-value	Estimates	t-value	Estimates	t-value	Estimates	t-value
%Zero trading	0.15	(1.83)*	0.15	(1.58)								
%Zero return					0.17	(2.24)**	0.21	(2.02)**				
Amihud ratio									0.03	(0.47)	0.05	(0.44)
Volatility			-0.80	(-1.09)			-0.65	(-0.86)			-0.82	(-0.98)
VC dummy			-2.81	(-1.57)			-2.99	(-1.66)*			-2.97	(-1.62)
Return on assets			0.004	(0.05)			0.001	(0.01)			0.004	(0.05)
Ln(assets)			-0.50	(-0.60)			-0.26	(-0.33)			-0.83	(-1.00)
Intercept	11.88	(14.55)***			10.25	(9.27)***			12.65	(15.77)***		
Industry dummies			yes				yes				yes	
Year dummies			yes				yes				yes	
R^2	0.0225		0.1918		0.0414		0.2096		0.0005		0.1785	
N	172		172		172		172		172		172	

Table IB-6: Relative Importance of Pre-Market Price and Peer Firms' Prices in Determining IPO Offer Price

When calculating the P/E ratio, we exclude three issuing firms with negative EPS and one firm with an outlier P/E value. *Offer-price P/E* is the ratio of the IPO offer price relative to the annual EPS prior to the IPO. *Pre-market P/E* is the ratio of the closing price on the pre-pricing day on the ESM relative to the annual EPS. *Industry-median P/E* is the median P/E ratio for firms in the same industry as the issuing firm, where the P/E ratio is based on a peer firm's closing price on the issuing firm's pre-pricing day and the peer firm's annual EPS prior to that day. For each issuing firm, we identify a matching firm that is traded on either TWSE or GTSM, is in the same industry and has the closest asset value. *Matching-firm P/E* is the ratio of the matching firm's closing price on the issuing firm's pre-pricing day relative to the matching firm's annual EPS prior to that day.

Panel A: Summary statistics

Variables	N	Mean	Median	Std. Dev	Minimum	Maximum
P/E						
Offer-price P/E	169	22.01	14.72	30.71	0.37	318.47
Pre-market P/E	169	29.32	19.38	37.67	0.51	332.80
Industry-median P/E	169	17.98	16.57	5.89	9.32	46.85
Matching-firm P/E	169	27.07	17.29	32.82	1.17	290.69

Panel B: Offer price P/E as the dependent variable

Model	(1)		(2)		(3)		(4)		(5)	
Variables	Estimates	t-value	Estimates	t-value	Estimates	t-value	Estimates	t-value	Estimates	t-value
Pre-market P/E	0.80	(10.09)***			0.81	(10.24)***			0.80	(10.26)***
Industry-median P/E			1.09	(3.5)***	-0.34	(-2.22)*				
Matching-firm P/E							0.17	(1.12)	0.005	(0.23)
Intercept	-1.32	(-0.7)	2.45	(0.46)	4.43	(3.03)***	17.54	(6.15)***	-1.43	(-0.67)
R^2	0.9527		0.0435		0.9567		0.0312		0.9527	
N	169		169		169		169		169	

Table IB-7: Determinants of Price Discount

The dependent variable is *Price discount,* defined as one minus the ratio of the offer price over the closing price on the pre-pricing day on the ESM. *Volatility* is the standard deviation of daily stock returns during the 3 months prior to IPO pricing. *VC dummy* equals to 1 if the firm is backed by venture capital and zero otherwise. *Return on assets* is annual earnings relative to assets. *t*-statistics are adjusted for heteroskedasticity. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

Model	(1)		(2)		(3)		(4)		(5)		(6)	
Variables	Estimates	t-value	Estimates	t-value	Estimates	t-value	Estimates	t-value	Estimates	t-value	Estimates	t-value
Price inaccuracy	0.10	(1.28)									0.07	(0.97)
Volatility			1.03	(1.43)							0.86	(1.26)
VC dummy					-2.61	(-2.08)**					-2.74	(-2.34)**
Return on assets							-0.03	(-0.47)			-0.02	(-0.4)
Ln(assets)									-1.59	(-3.4)***	-1.46	(-3.3)***
Intercept	21.78	(19.31)***	20.16	(10.8)***	24.53	(25.99)***	23.25	(26.28)***	45.53	(6.72)***		
Industry dummies											yes	
Year dummies											yes	
R^2	0.0141		0.0314		0.0247		0.0014		0.0428		0.3349	
N	172		172		172		172		172		172	

Table IB-8: Intended Price Discount and Underwriter Fees

The FPO subscription ratio is the total demand from the fixed-price offering tranche, relative to the shares sold through that tranche. The FPO fee is 8.5 times the FPO subscription ratio, relative to the offer price. The *bookbuilding fee* is the fees bookbuilding investors pay for each share allocated to them, relative to the offer price. The *total investor fee* is the weighted average of the FPO fees and the bookbuilding fee, where the weighting variable is the proceeds raised in the two tranches. *Intended price discount* equals one minus the ratio of the midpoint of the price range over the closing price on the day before bookbuilding starts. *Volatility* is the standard deviation of daily stock returns during the 3 months prior to IPO pricing. *VC dummy* equals to 1 if the firm is backed by venture capital and zero otherwise. *Return on assets* is annual earnings relative to assets. *t*-statistics are adjusted for heteroskedasticity. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

Panel A: Summary statistics

Variables	N	Mean	Median	Std. Dev	Min.	Max.
FPO subscription ratio	172	44.80	36.17	35.73	2.10	212.77
FPO fee (%)	172	0.95	0.72	0.88	0.07	6.39
Bookbuilding fee (%)	172	2.41	2.35	1.86	0.00	14.08
Total investor fee (%)	172	1.60	1.57	1.00	0.02	5.88
Intended price discount (%)	172	21.83	21.17	8.84	-6.06	46.73

Panel B: The dependent variable is the FPO subscription ratio

Model	(1)		(2)	
Variables	Estimates	t-value	Estimates	t-value
Intended price discount	2.49	(9.15)***	2.39	(8.07)***
Volatility			-1.08	(-0.9)
VC dummy			-0.25	(-0.06)
Return on assets			0.23	(1.12)
Ln(assets)			-10.60	(-5.52)***
Intercept	-9.51	(-1.84)*		
Industry dummies			yes	
Year dummies			yes	
R^2	0.3786		0.6242	
N	172		172	

Panel C: The dependent variable is the bookbuilding fee.

Model	(1)		(2)	
Variables	Estimates	t-value	Estimates	t-value
Intended price discount	0.03	(2.29)**	0.04	(2.6)**
Volatility			-0.07	(-0.56)
VC dummy			0.76	(2.63)***
Return on assets			0.02	(1.54)
Ln(assets)			-0.13	(-1.02)
Intercept	1.69	(4.79)***		
Industry dummies			yes	
Year dummies			yes	
R^2	0.0247		0.2861	
N	172		172	

Panel D: The dependent variable is the total investor fee.

Model	(1)		(2)	
Variables	Estimates	t-value	Estimates	t-value
Intended price discount	0.03	(3.87)***	0.04	(4.25)***
Volatility			-0.018	(-0.31)
VC dummy			0.39	(2.56)**
Return on assets			0.004	(0.51)
Ln(assets)			-0.20	(-3.03)***
Intercept	0.86	(4.35)***		
Industry dummies			yes	
Year dummies			yes	
R^2	0.0912		0.4072	
N	172		172	

Table IB-9: Underwriter brokerage revenues and money left on the table from IPOs

The regressions in this table include observations of lead underwriter-years where the lead has underwritten at least one IPO. We exclude years where the underwriter experiences a merger and acquisition. For each IPO, we compute money left on the table as the shares issued times the difference between the pre-market price on the day before IPO pricing and the offer price. For each underwriter-year, we sum up the *total money left on the table* from the IPOs that the bank lead underwrites. ***, **, and * denote significance at the 1, 5, and 10 percent level, respectively.

Model	Current year's brokerage revenue		Next year's brokerage revenue	
Variables	Estimates	t-value	Estimates	t-value
Total money left on the table	0.06	(0.19)	-0.06	(-0.28)
Underwriter dummies	yes		yes	
R^2	0.9571		0.9932	
N	57		39	

Table IB-10: Underwriter impact on underpricing

Panel A reports the mean *percentage price discount* for subsamples based on three variables. In other words, Panel A reports the conditional percentage price discounts. We categorize an IPO observation as having high underwriter incentive/power to underprice if it has above-median *lead percentage* or above-median *previous price discount,* or its value of *issue again* equal to one. The other IPOs are categorized into low incentive/power subsamples. *Price discount* is one minus the ratio of the offer price over the closing price on the pre-pricing day on the ESM, multiplied by 100%. *Lead fraction* is the percentage of shares sold by the lead underwriter. *Previous price discount* is the average price discount in the previous three year. *Issue again* is a dummy variable equal to one if the firm issues any public securities (seasoned equity offerings or corporate bonds) again in the next two years. Panel B estimates regressions with price discount as the dependent variable.

Panel A: Mean percentage price discount by subsamples

	Lead fraction	Previous price discount	Issue again
High underwriter incentive/power	24.15	21.98	23.09
Low underwriter incentive/power	21.86	23.34	22.98
Difference	2.29**	-1.364	0.11

Panel B: Regression results with the percentage price discount as the dependent variable

Model	(1)		(2)		(3)	
Variables	Estimates	t-value	Estimates	t-value	Estimates	t-value
Lead fraction	6.28	(0.85)				
Previous % price discount			-0.05	(-0.29)		
Issue again					2.21	(1.34)
Ln(assets)	-0.55	(-0.90)	-0.32	(-0.53)	-0.60	(-1.01)
Volatility	92.83	(2.14)**	168.99	(3.18)***	94.54	(2.19)**
VC	-1.89	(-1.54)	-1.85	(-1.49)	-2.09	(-1.72)*
ROA	2.95	(0.90)	3.75	(1.13)	3.12	(0.95)
Industry dummies	yes		yes		yes	
Year dummies	yes		yes		yes	
R^2	0.270		0.323		0.275	
N	172		152		172	