

The Pricing of Initial Public Offering and Market Efficiency

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Abstract: This study investigates long-run performance of Thai initial public offerings (IPOs). To examine the long-run performance of Thai IPOs, we compute buy-and-hold abnormal returns and cumulative abnormal returns for two years after the IPOs. We find strong evidence of long run underpricing in Thai market. Specifically, the average buy-and-hold abnormal returns and cumulative abnormal returns are 64.5% and 18.4% respectively. However, our multivariate analysis does not indicate a strong relation between long-run underperformance and firm-specific factors, such as firm size, firm age, investment banker reputation and firm profitability.

Keywords: Initial Public Offerings; Long-run Underperformance; Market Efficiency; Stock Exchange of Thailand.

1. INTRODUCTION

This study investigates the relationship between the long-run performance of the IPOs and firm characteristics. Specifically, we examine how quality, risk and reputation of the firms (age, investment banker reputation and profitable of firms) and size of the firms (gross proceeds) affect long run underperformance after the IPOs. Our study relates to two branches of prior research for the long-run underperformance of IPOs.

The first branch identifies the existence of underperformance and provides behavioral and expectations-based explanations for the phenomenon. A sub group within this group tries to explain long-run underperformance using underpricing models. Hughes and Thakor (1992) propose that the underperformance is due to failure to include value of legal damages in performance evaluation but Alexander (1993) points out that the risk of litigation is not significant in most of the developed countries. Several researchers have put forward the price hypothesis for explaining the long-run underperformance. The hypothesis is based on the assumption that underwriters keep the initial trading prices artificially high and once the price support has been withdrawn the prices will adjust downwards to their true market value. Following the approach advocated by Rudd (1993) and Ljungqvist (1996) tested implications of this hypothesis and found that the evidence was partly inconclusive. Miller (1977) suggested that the marginal, most optimistic investor sets share prices. As information flows increase with time, the divergence of expectations decreases and thus the prices are adjusted downwards, i.e. long-run performance is negatively related to the extent of divergence of opinion. It is difficult to test this hypothesis because it is difficult to measure the divergence of opinion. Ritter (1991) and Rajan and Servaes (1994) among others argue that firms go public when investors are over-

optimistic about the growth prospects of IPO companies. Investors overpay initially but mark prices down as more information becomes available hence expected long-run returns therefore decrease with the decrease in initial investor sentiment.

The second branch provides explanation for the poor long-run performance using the agency costs hypothesis. Jain and Kini (1994) and Mikkelsen, Partch and Shah (1997) investigated if there is a relation between long-run performance and ownership. Using data from the US market, they found different results. Jain and Kini (1994) found a significant positive relation between post-IPO operating performance and equity retention by the original shareholders. However, Mikkelsen, Partch and Shah (1997) found that in general, the long-run performance both within one year of offering and during the first ten years of public trading is unrelated to the ownership structure.

The remainder of this study is organized in four sections. Section 2 discusses a brief literature review. Section 3 and 4 describes data, methodology and model specifications. Section 5 reports the empirical results and discussion of findings and Section 6 contains conclusions.

2. LITERATURE REVIEW

This section describes literatures of the long-run of IPOs. Ibbotson (1975) reported a negative relation between initial returns at the IPO and long-run share price performance for a sample of U.S. IPO issued during the period of 1960 to 1969. He finds that the U.S. IPO market in general shows positive performance in the first year, negative performance in the next three years and a general positive performance in the fifth year. Ritter (1991) analyzes the performance of U.S. IPO issued during 1975 to 1984 and states that they underperformed the market performance (NASDAQ and AMEX-NYSE) by about 29% in the three year period after their launch. More recently Carter, Frederick and Singh (1998) show that over a three-year period after the IPO, the US firms underperformed the market (NYSE/AMEX/NASDAQ)

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by 19.92 %. Work in other countries has shown that long-run market adjusted returns are negative with the notable exceptions of Korea (Kim, Krinsky and Lee (1995)) which exhibit a significant positive long-run performance, especially for the first month after the public offering. The degree of underperformance has been highest in Australia as 51.0% (Lee, Tayler and Walter (1996)) followed by Brazil as 47.0% (Aggarwal, Leal and Hernandez (1993)).

Previous research attempt to analyze the long-run underperformance is a function of the managerial decisions and performance of the firm prior to going public. Lee, Tayler and Walter (1996) study Australian IPO pricing in short-run and long-run and use gross proceeds, firm age, degree of underpricing and retention ratio for the variables to test long-run underperformance. How (2000) also studies Australian IPO long-run performance but she focuses on Australian IPO mining industry firms. Her study uses explaining variables as in Lee, Tayler and Walter (1996) study. In addition, her result shows the OLS regression supports a curvilinear relationship between degree of underpricing and the first and second year's returns, consistent with Lee, Tayler and Walter (1996) result. However, in contrast to Lee, Tayler and Walter (1996), her study finds that mining IPO with a higher level of informs demand have significantly worse performance in each of the three years after listing than those with a lower level of informed demand.

3. DATA AND METHODOLOGY

3.1. Data

The data used in the analysis comprises 150 IPOs from the Stock Exchange of Thailand (SET) and the Market for Alternative Investment (MAI) from January 2001 to December 2015. This study excludes seasonal equity offering (SEO), property funds, preferred stocks, unit trusts, depositary receipts, warrants and derivative warrants.

3.2. Methodology: Long-Run Abnormal Returns

This section presents long-run performance of initial public offerings and explanatory variables. The first sub-section explains calculation methods of long-run abnormal returns and summarizes the description of initial returns. The second sub-section describes the explanatory variables.

We measure the long-run performance of IPOs by using cumulative average market adjusted abnormal return (CAR) and buy-and-hold abnormal return (BHAR) for which investment horizons are set at 50, 100, 150, ..., 450 and 500 days after the first trading day.

3.2.2. Cumulative Adjusted Returns (CAR)

We calculate cumulative average market adjusted returns (CAR) for IPOs from day 1 to day T. The day 1 means the first day after the initial trading day. The return on day 1 calculated from the closed price of the first trading date. Abnormal return (arit) is defined as;

$$ar_{it} = r_{it} - r_{mt} \quad (1.1)$$

Abnormal return is the raw return on the IPOs minus the return on the market during a particular period. In this study,

the return on the market will be measured by the SET and MAI index. The average market adjusted return of N stocks at event month t (ARt) is the equally weighted arithmetic average of the market adjusted returns;

$$AR_t = \frac{1}{N} \sum_{i=1}^N ar_{it} \quad (1.2)$$

The cumulative market adjusted abnormal return is the summation of the average market adjusted returns;

$$CAR_t = \sum_{t=1}^T AR_t \quad (1.3)$$

3.2.3. Buy-and-Hold Abnormal Returns (BHAR)

We calculate the buy-and-hold abnormal returns (BHAR) as the difference between the holding-period return of IPOs i.

$$BHAR_{i,T} = \prod_{t=1}^T (1 + r_{i,t}) - \prod_{t=1}^T (1 + r_{m,t}) \quad (1.4)$$

The mean of buy-and-hold abnormal returns is defined as follows.

$$\overline{BHAR}_{i,T} = \frac{1}{N} \sum_{i=1}^N BHAR_{i,T} \quad (1.5)$$

A positive buy-and-hold abnormal return is interpreted as a better performance of the respective IPOs compared to the benchmark. The mean buy-and-hold abnormal return is computed as the arithmetic average of abnormal returns on all IPOs in the sample.

3.2.4. Long-Run Explanatory Variables

We conjecture that the long-run performance of the IPOs is a function of the firm characteristics and performance of the firm prior to going public. To test this proposition, we use a number of characteristics of the firms in sample. These characteristics are used as proxies for quality and reputation of the firms and proxies for size. The followings describe the names, definitions and characteristics of the variables use in this study

Firm Size. Levis (1993) studies the long-run performance in U.K. during 1980 to 1988 and uses the gross proceeds from the offering as a proxy for firm size to test relationship between long-run performance and offer amount. Khurshed, Mudambi and Goergen (1999) also study the U.K. IPOs during January 1991 to June 1995. But they use two other variables, namely, the net assets of the firm in the year before the listing and the market capitalization of the firm at the time of the prospectus. However, their results are similar and are concluded that the larger firms perform better in the long run. Following Levis (1993) and Khurshed, Mudambi and Goergen (1999), we use gross proceeds (GROSS_PROC) to test relationship between long-run performance and firm size.

Firm Age. Aggarwal and Rivoli (1990) attribute underperformance to a temporary overvaluation of the IPOs firm at the offering date, the so-called 'fads' theory. After a while

the over optimism disappears and the value of the new share will be adjusted downward. Ritter (1991) also promotes the fads theory and shows that IPOs firms with a high risk profile; for example, younger or smaller have low performance soon. Following previous research, we use firm age variable (AGE) as a measure of the risk profile of an initial public offering. AGE is therefore also a proxy for the ‘fads’ theory. The age of the firm is expected to have a positive effect on the aftermarket performance of IPOs.

Investment Banker Reputation. The first proxy, IBREP_MKTSH equals 1 if the investment banker’s market share in IPOs market is above the median of all individual investment banker’s market share in IPOs market and 0 if the investment banker’s market share is below the median of all investment banker’s market share. The second proxy is IBREP_FREQ which equals 1 if the investment banker’s frequency of clients in IPOs market is above the median of all individual investment banker’s frequency of clients in IPOs market and 0 otherwise.

Firm Profitability. Geroski and Jacquemin (1988) Machin and Van Reenen (1993) posit that a firm which is profitable before going to public should continue to be so after the IPOs. We use the earning per share of firm (EPSF) which is disclosed on its prospectuses as a proxy for firm profitability.

4. MODEL SPECIFICATIONS

We employ ordinary least squares (OLS) method to examine the relationship between long-run performance and proxy for firm size, proxy for reputation, proxy for firm age and proxy for firm profitability. We use long-run market adjusted abnormal return (AR) and the market adjusted buy-and-hold

abnormal return (BHAR) in period T as the dependent variable in the regression analysis. Additional, this study employs firm characteristics and firm performance before listing (GROSS_PROC, AGE, IBREP_MKTSH, IBREP_FREQ and EPSF) as the explaining variables. The regressions which test relationship between these variables and the long-run performance are shown in equations (1.6) and (1.7).

$$CART = \beta_0 + \beta_1 (\text{gross proceeds})_i + \beta_2 (\text{firm age})_i + \beta_3 (\text{investment banker reputation})_i + \beta_4 (\text{firm profitability})_i + u_i \tag{1.6}$$

$$BHART = \beta_0 + \beta_1 (\text{gross proceeds})_i + \beta_2 (\text{firm age})_i + \beta_3 (\text{investment banker reputation})_i + \beta_4 (\text{firm profitability})_i + u_i \tag{1.7}$$

5. EMPIRICAL RESULTS

5.1. Descriptive Statistics and Univariate Analysis

Table 1 reports the descriptive statistics of the cumulative average market adjusted returns (CART) and buy and hold abnormal returns (BHARt). Panel A shows the cumulative average market adjusted returns (CART) for the 500 days after the offering date. The CARs for the sample firm are negative and statistically significant after 400th day. The pattern of IPO underperformance is quite similar to that reported in the previous study. Panel B shows buy and hold abnormal returns (BHARt) for 500 days after the offering date. The results are similar to CARs which show that Thai IPOs significantly underperformed in the long-run.

Table 1. Cumulative Market Adjusted Returns and Buys and Hold Abnormal Returns.

This table presents cumulative market adjusted returns and buys and holds abnormal returns. The sample data comprises of 150 firms during 2001 to 2004. CART is the cumulative market adjusted return defined as $(1/N)(\sum AR_t)$. ART is the average of the market adjusted return defined as $(1/N)(\sum art)$. BHAR is the buy and hold abnormal returns defined as $(1/N)\{P(1+ri,t)-P(1+rm,t)\}$. *, ** and *** indicate statistical significant at ten, five and one percent levels, respectively.

Panel A: Average and Cumulative Adjusted Returns									
Days	N	CAR						T-Stat	
		Average	Median	Maximum	Minimum	S.D.			
50	97	-2.71%	-3.99%	102.72%	-107.39%	33.69%	-0.79		
100	97	-0.55%	-3.96%	136.07%	-114.40%	43.58%	-0.12		
150	97	-4.40%	-5.55%	136.85%	-123.49%	49.96%	-0.87		
200	97	0.31%	-4.04%	170.50%	-124.54%	58.34%	0.05		
250	97	0.28%	0.07%	211.94%	-127.40%	62.37%	0.04		
300	97	-5.04%	-4.35%	205.15%	-184.86%	65.72%	-0.76		
350	97	-9.83%	-6.99%	211.47%	-159.92%	64.27%	-1.51		
400	97	-17.92%	-13.03%	138.58%	-166.00%	68.26%	-2.59	**	
450	97	-16.34%	-9.87%	175.19%	-185.77%	75.57%	-2.13	**	
500	97	-15.95%	-18.44%	149.12%	-172.94%	74.22%	-2.12	**	

Panel B: Buy and Hold Abnormal Returns								
Days	N	BHAR						
		Average	Median	Maximum	Minimum	S.D.	T-Stat	
50	97	-6.90%	-11.56%	205.55%	-158.79%	58.38%	-1.16	
100	97	-9.30%	-19.62%	272.28%	-149.00%	74.31%	-1.23	
150	97	-21.75%	-28.12%	200.09%	-175.61%	81.81%	-2.62	**
200	97	-17.89%	-18.83%	252.37%	-268.89%	95.43%	-1.85	*
250	97	-26.21%	-20.19%	316.11%	-302.21%	100.20%	-2.58	**
300	97	-44.56%	-40.58%	237.40%	-422.31%	106.27%	-4.13	***
350	97	-59.48%	-44.72%	279.77%	-494.31%	115.86%	-5.06	***
400	97	-77.77%	-47.71%	163.34%	-695.66%	140.44%	-5.45	***
450	97	-79.13%	-59.66%	202.62%	-747.87%	148.51%	-5.25	***
500	97	-82.62%	-66.47%	166.42%	-743.00%	145.10%	-5.61	***

Table 2. Summary Statistics of Long-Run Explaining Variables.

This table presents the descriptive statistics of long-run explaining variables. The sample data comprises of 150 firms during 2001 to 2015. LN (GROSS_PROC) is the natural logarithm of gross proceeds. AGE is the duration of a firm established to going public. IBREP_MKTSH is investment banker reputation proxy equals 1 if the investment banker’s market share in IPO market is above the median of all individual investment banker’s market share in IPO market and equals 0 if otherwise. IBREP_FREQ is investment banker reputation proxy equals 1 if the investment banker’s frequency of clients in IPO market is above the median of all individual investment banker’s frequency of clients in IPO market and equals 0 if otherwise. EPSF is earning per share of IPO firm before the first trading date which is the firm’s profitability proxy.

	n	Mean	Median	Std. Dev.	Skewness	Kurtosis	Max.	Min.
GROSS_PROC (Mil.)	97	1,090	350	3,610	7	61	32,200	28
AGE	97	12.93	11	8.67	1.65	6.45	49	1
IBREP_MKTSH	97	0.81	1	0.39	-1.62	3.62	1	0
IBREP_FREQ	97	0.8	1	0.4	-1.53	3.35	1	0
EPSF	97	-0.37	0.16	4.36	-6.73	50.39	2.53	-35.52

Fig. (1). shows the comparative long-run performance between the cumulative average adjusted returns (CART) method and the buy and hold abnormal returns (BHARt). Both BHARt and CART show the underperformance in the long-run and BHARt continually decrease more than CART because BHARt method based on compounding profits and losses.

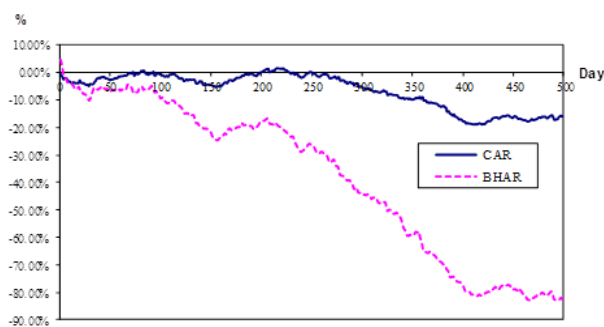


Fig. (1). Cumulative Abnormal Returns and Buy and Hold Abnormal Returns of Thai IPOs.

Table 2 presents the summary statistics of long-run explanatory variables. The table describes mean, median, standard deviation, minimum and maximum, respectively. The mean and median of firm age (AGE) are 12.93 and 11.00 years, respectively. The average of gross proceeds (GROSS_PROC) is the offer price multiply by number of offering share as 1,090 million baht. The investment bankers’ reputations are measured by market share and number of client criterion (IBREP_MKTSH and IBREP_FREQ) and have average value of 0.81 and 0.80, respectively. Finally, the average of earning per share before the firm going public is -0.37 baht and median is 0.16 baht.

Table 3 reports the Pearson correlation matrix. Panel A shows that LN(GROSS_PROC), IBREP_MKTSH, and IBREP_FREQ have negative relation with the cumulative average market adjusted return (CAR). These relationships contrast with Levis (1993) who discloses that the larger firms (measured by gross proceeds) perform better than the smaller firms in the long run. However, the negative relationships

between LN(GROSS_PROC), IBREP_FREQ and CAR are not statistically significant. The CAR between the 150th (CAR150) and 300th (CAR300) are negative but the rest are positive and all of them are not statistically significant. Panel B shows the Pearson correlation matrix among buy and hold abnormal return (BHAR) and explanatory variables. Buy and hold abnormal returns (BHAR) have the positive relation with investment reputation (IBREP_MKTSH and IBREP_FREQ). There is negative relationship between (BHAR) and the earning of firms (EPSF).

5.2. Multivariate Analysis Results

Table 4 presents the long-run performance analysis. In Panel A, cumulative market adjusted returns (CAR) computed for

various holding periods are used as dependent variable. The results show that CAR for all periods cannot be explained by the firm-specific variables. The coefficient of determinant adjusted R2, indicating the percentage of total variation of cumulative market adjusted returns explained by explanatory variables are not high. In Panel B, buy and hold abnormal returns computed for different holding periods are set as the dependent variables. The results are similar to the cumulative market adjusted return analysis, except for EPSF are negatively significant related to BHAR. The adjusted R2 indicates that the percentage of total variation of buy and hold abnormal returns that can be explained by explanatory variables are not high.

Table 4. Long-run Performance Analysis Results (Multivariate Analysis Results).

Panel A: Long-run Performance Analysis Results Using Cumulative Market Adjusted Returns as the Dependent Variables

This table presents the multivariate regression results estimated by the ordinary least squares method. The sample data comprises of 150 firms during 2001 to 2015. BHAR_t are the buy and hold abnormal returns at the day t. LN (GROSS_PROC) is the natural logarithm of gross proceeds. AGE is the duration of a firm established to going public. IBREP_MKTSH is investment bankers' reputation proxy equals 1 if the investment banker's market share in IPO market is above the median of all individual investment bankers' market share in IPO market and equals 0 if otherwise. EPSF is the earning per share of firms. *, ** and *** indicate statistical significant at ten, five and one percent levels, respectively.

Dep. Variables	Const.	Explanatory Variables					Adjusted R-Square	F-Test
		LN (GROSS_PROC)	AGE	IBREP MKTSH	EPSF			
CAR50	-0.3890	0.0228	-0.0031	-0.0538		0.0100	0.0165	0.6114
CAR100	0.1424	0.0014	-0.0017	-0.1841		0.0111	0.0033	0.9204
CAR150	0.1500	0.0039	-0.0063	-0.2280	*	0.0070	0.0047	1.1130
CAR200	0.3309	-0.0035	-0.0082	-0.1846		0.0052	0.0097	0.7687
CAR250	0.8402	-0.0370	-0.0064	-0.0308		-0.0055	0.0244	0.4278
CAR300	0.5005	-0.0272	-0.0057	0.0754		0.0036	0.0328	0.2369
CAR350	0.5226	-0.0317	-0.0016	0.0356		0.0060	0.0372	0.1391
CAR400	0.2964	-0.0214	-0.0007	-0.0550		-0.0003	0.0402	0.0725
CAR450	-0.1106	-0.0001	-0.0027	-0.0239		-0.0063	0.0406	0.0636
CAR500	-0.1935	0.0020	-0.0013	0.0163		0.0021	0.0430	0.0097

Panel B: Long-run Performance Analysis Results Using Buy and Hold Abnormal Returns as the Dependent Variables

This table presents the multivariate regression results estimated by the ordinary least squares method. The sample data comprises of 150 firms during 2001 to 2015. BHAR_t are the buy and hold abnormal returns at the day t. LN (GROSS_PROC) is the natural logarithm of gross proceeds. AGE is the duration of a firm established to going public. IBREP_MKTSH is investment bankers' reputation proxy equals 1 if the investment banker's market share in IPO market is above the median of all individual investment bankers' market share in IPO market and equals 0 if otherwise. EPSF is the earning per share of firms. *, ** and *** indicate statistical significant at ten, five and one percent levels, respectively.

Dep. Variables	Const.	Explanatory Variables					Adjusted R-Square	F-Test		
		LN (GROSS_PROC)	AGE	IBREP MKTSH	EPSF					
BHAR50	-1.0704	0.0410	0.0002	0.2155		-0.0359	***	0.0653	2.6769	**
BHAR100	-1.0221	0.0344	0.0046	0.2162		-0.0364	**	0.0246	1.6063	*

BHAR150	-1.0576	0.0306	-0.0030	0.3223		-0.0346	*	0.0217	1.5334	*
BHAR200	-1.4436	0.0472	-0.0024	0.4302	*	-0.0337		0.0212	1.5189	*
BHAR250	-0.9773	0.0158	-0.0050	0.5628	**	-0.0251		0.0212	1.5210	*
BHAR300	-0.5001	-0.0151	-0.0050	0.5005	*	-0.0259		0.0026	1.0619	
BHAR350	0.3028	-0.0631	0.0028	0.3706		-0.0298		0.0158	0.6265	
BHAR400	0.6268	-0.0869	0.0106	0.2013		-0.0338		0.0246	0.4236	
BHAR450	-0.1124	-0.0446	0.0117	0.0486		-0.0305		0.0315	0.2664	
BHAR500	0.4254	-0.0753	0.0114	0.0971		-0.0282		0.0305	0.2905	

6. CONCLUSIONS

The purpose of this study is to examine the relationship between the long-run performance of the IPOs and firm characteristics. Specifically, we examine how quality, risk and reputation of the firms (age, investment banker reputation and profitable of firms) and size of the firms (gross proceeds) affect long run underperformance after the IPOs. This paper provides a number of findings. First, we find strong evidence of long run underpricing in Thai market. Specifically, the average buy-and-hold abnormal returns and cumulative abnormal returns are 64.5% and 18.4% respectively. Second, however, our multivariate analysis does not indicate a strong relation between long-run underperformance and firm-specific factors, such as firm size, firm age, investment banker reputation and firm profitability. The findings provide insightful information to various market participants such as investors, investment bankers and regulators. The IPOs underpricing and the long-run underperformance are the phenomena occurring in Thailand stock market. The findings suggest investors to consider firm-specific and market environment before investing in IPOs. Investment banker should provide more conclusive information to their clients and the public. Finally, this evidence also shows regulators the factors affecting the IPO stability which may be useful for regulators in issuing more suitable rules and regulations to promote transparency and fairness market.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

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