

# A Comparative Study on the IPO Pricing Efficiency between China and Hong Kong Stock Market

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## Abstract

This paper carries on a comparative study between China and HK stock market, aiming at finding out the structural discrepancy between the two. The empirical study results as follows: the IPO price in China focuses on the internal factor of firm, little information in the issue factor and market factor. However, the IPO price of HK includes not only the internal factor of firm, but also the information of issue factor and market factor. These show that there still exist a lot of limitations in IPO pricing efficiency for China stock market.

**Keywords:** IPO, pricing efficiency, multi-regression analysis

## 1. Introduction

Pricing of initial public offerings (IPOs) is the most basic but critical problem in the whole IPO process, which may be related to the fundamental interest of all parties or potential participants, and would directly effect on the long-term performance of the new issues. Prior literatures have shown that early study on the IPO pricing efficiency more focuses on the problem of IPOs underpricing, which assumes that the measure of pricing efficiency is the underpricing rate which the issue price departs from the market price (usually the first-day closing price). Thus based on this assumption,

many hypotheses and theories have been set up to give their explanation, such as the Winners' Curse Hypothesis (Beatty & Ritter, 1986<sup>[1]</sup>; Rock, 1986<sup>[2]</sup>), the Signaling Hypothesis (Allen & Faulhaber, 1989<sup>[3]</sup>), the Bandwagon Hypothesis (Welch, 1992), the Ownership Dispersion Hypothesis (Brennan & Franks, 1995<sup>[4]</sup>) and the like. Based on their prior studies, many explanations are also given to the formation of IPOs' underpricing in China, which assumes that IPO underpricing in China may attribute to imperfection of IPO mechanism (Zhang Ren-ji et al, 1999) or excess speculations in the secondary market, the serious contradiction of supply and demand in the primary market, the immature investing believes and the asymmetry information (Wang Chun-feng et al, 2002).

Literature above pays more attention to the underpricing of the IPOs, which only give their explanations to the departure of the issue price from the market price. But it is not reliable enough to evaluation the IPO pricing efficiency. Because all their studies are based on the efficient market assumption, i.e. market price is the efficient equilibrium price at which assets are traded in a complete efficient market, which may not be consistent with the practice of all markets. According to Efficient Market Hypothesis (EMH), efficient price is best evaluation for the internal value of assets any time when it is the induced result by all kinds of information from the market. Based on this theory,

high efficient IPO pricing should not only be incarnated in the underpricing rate, but also be reflected in all the information related and available. Thereby a new study view, named Information Efficiency View (IEV), is advanced and promoted. In fact, according to studies of Benveniste & Spindt (1989), Benveniste & Wilhelm (1990)<sup>[5]</sup>, Spatt & Srivastava (1991), comparing with other IPO mechanism, accumulated indent inquiry mechanism will avail the invest banks to gather more information on the real value of IPOs and thereby give their correct pricing. Lowry & Schwert (2004) set up a concise pricing model to analyze whether public information is fully incorporated into the price interval, so as to evaluate the IPOs pricing efficiency<sup>[6]</sup>. Research of Duan Jin-dong et al (2004) indicates that IPOs price mainly reflects the internal information of new issues, but very little external information related, which illustrates its limited pricing efficiency<sup>[7]</sup>. Yu Yin et al (2005) validates that IPOs price incorporates more information than that in the examination system times. IPO mechanism innovation avails the improvement of IPOs pricing rationality but increases the market risk<sup>[8]</sup>.

Although based on IEV, a large number of empirical studies upon the IPO pricing efficiency in domestic market have been carried on, most of them focus on the comparison of the different timing dimensions or system dimensions (Mao Zongping & Chuan Wen, 2004; Zhou Xiaohua, 2005), yet very few literatures involve the research on the IPO pricing efficiency via cross-market and trans-regional comparative study, which also lack of empirical test. Thus it is very limited for them to point out the development path of our IPOs pricing and direct the innovation for our IPO mechanism, where study gap is exposed in this area. On the other hand, in our market practice, recent years China stock market has ex-

perience severe fluctuation. IPO pricing efficiency is suspected once again in every aspect. In contrast, HK persists in the registration for a long history, which has experienced years' innovations and perfection. Its IPO price and mechanism tend to be more mature and steady. Thus learning from HK and perfecting our IPO mechanism is put forward and promoted. Therefore, the object of this paper is to carry on a comparative study on the IPO pricing efficiency between China and HK stock market, aiming at finding out the structural discrepancy between the two, and giving some advice to the development path of our IPO mechanism.

## **2. Research design and methods**

### **2.1. Measure standard**

Generally there exist two kinds of criterions for measuring the IPO pricing efficiency. One is the absolute standard, which means that IPO price should be consistent with real market value of a stock, i.e. efficiency is measured by its underpricing. Another one is the relative standard, which argues that high efficiency means the offering price should reflect all the related information of the stock, i.e. efficiency is measured by its information content (Mao Zongping & Chuan Wen, 2004). This paper intends to exploit the difference of all information factors which are sensitive to IPO price and compare the structural discrepancy between the two under different systems. Therefore, adopting the latter will be more consistent with our study.

### **2.2. Sample selection**

It is not until March 17th, 2001 when China launched the approval system, yet registration has been adopted and persisted in for a long history in HK. Thus all the IPOs in Shanghai Security Exchange (SSE) and Hong Kong Security

Exchange (HKE) between January 1st, 2003 and December 31st, 2007 are selected as our study samples. SSE stocks are all A shares, yet HKE ones are all from the main board. Removing several sample points due to the historical problems or the inadequate disclosed information, 351 sample points remain at last, 146 from the SSE and 205 from the HKE, which is able to satisfy and measure up to the statistical request in econometrics. All the data and information originate from Wind Database and SSE and HKE.

### 2.3. Index system

Generally speaking, influence factors of the IPO pricing are divided into three types, which are the internal factor, issue factor and market factor (Lowry & Schwert, 2004; Duan Jindong et al, 2004; Yu Yin et al, 2005). The internal factor reflects all kinds of information of firms' internal quality and development, which are Earnings per share (EPS), Book value per share (BPS), Return on equity (ROE), Debt rate (DR), Currency rate (CR), Growth of total asset (GTA), Growth of total sales (GTS), Total capital stock (TCS), Total asset (TA). All of the sub-factors are financial indices from the last fiscal year before IPO.

The issue factor mainly refers to new issues' supply and demand state of the primary market as well as the risk and characters of their IPO, which are Issue volume (IssV), Offer method (OM), Sponsors' prestige (SP). For IssV, the paper uses the value of its natural logarithm. For A shares, OM equals to 1 if offered by inquiry, 0 otherwise. SP equals to 1 if sponsors rank top ten in China (Guotai Junan, CITIC, Haitong, China Galaxy, Shenyin & Wangguo, GF, China Commercial, Guoseng, China, EverBright.), 0 otherwise. For HK shares, OM equals to 1 if offered for subscription or placement or both, 0 otherwise. SP equals to 1 if sponsors rank top fifteen in the world

(Citigroup, Lehman Brothers, Merrill Lynch, Credit Suisse, Morgan Stanley, Goldman Sachs, Bear Stearns, Deutsche Bank, UBS Warburg, Prudential, J.P. Morgan, Banc of America, Sanford C Bernstein, International Strategy & Investment, SG Cowen), 0 otherwise.

Yet the market factor depicts the outer situation which is independent of the firm's normal operation and does not directly reflect the operating quality, but will indirectly influence the future development of the firm, which are Registered Region (RR), Industry (Ind), Market situation (MST), Market Risk (MR). For A shares, RR equals to 1 if firms lie in China's 12 eastern provinces or municipalities (Guangdong, Fujian, Zhejiang, Jiangsu, Shandong, Hebei, Liaoning, Hainan, Beijing, Shanghai, Tianjin, Guangxi), 0 otherwise. Ind equals to 1 if it belongs to high value industry, 0 otherwise (Finance, real estate, insurance, information technology, medicine manufacture, biology manufacture). For HK shares, RR equals to 1 if firms registered in the world's top-three offshore registration centers (Cayman Islands, Bermuda, and BVI), 0 otherwise. Ind equals to 1 if it belongs to high value industry (Finance, other finance, banking, real estate, software service, health care, semiconductor, information science technology instrument, communication), 0 otherwise.

MST = mean of its typical market index in the last 20 trading days before IPO / index value on the offer day. MR = standard deviation of its typical market index in the last 20 trading days before IPO. Here as the typical market index, for China we select SSE Composite Index, for HK we select Hang Sang Index.

### 2.4. Study methods

The main study methods are factor analysis and regression analysis. The internal factor is measured by the firms' financial indices. There may exist a strong multi-

collinearity between them in the abstract. Thus the first step is to exert factor analysis for all these finance indices and extract their principle components. The second step is to take the offer price as the dependent variable, all the influence sub-factors of the internal factor, the issue factor and the market factor as the independent variables, to set up an econometric model and use multi-regression analysis to exploit the relationship between the IPO price and all influence factors, so as to draw a comparison of the IPO pricing efficiency between the two markets under different mechanism. Statistical softwares are EVIEWS 3.1 and SPSS 13.0.

### 3. Data Analysis

#### 3.1. Data standardization

Dimensions of all the financial indices in this paper are not consistent with each other, some of which even have large disparity in variance. In order to remove their serious effect on the factor loadings, standardization is taken to all the financial indices (both for A shares and HK shares), i.e. all the primitive data values are converted into a united dimension which would be able to bring into comparison.

#### 3.2. Factor analysis

Factor analysis is carried on separately for the A shares' and HK shares' nine financial indices, and components whose initial eigenvalues are more than 1 are extracted. The statistical result shows that, for the both two markets, there are 4 factors whose eigenvalues are more than 1 and whose accumulated variance explained add up to 80.840% and 76.272%. Using the method of principle components, 9 financial indices at last regress into 4 principle factors by varimax rotated. All of them have their own evident

economic meanings (see Table 1 and Table 2).

Tab. 1: The rotated component matrix (A shares)

Influence factors	The rotated component matrix			
	Scale	Prospect	Profits	Credits
EPS	0.022	0.420	<b>0.866</b>	-0.060
BPS	0.047	-0.065	<b>0.917</b>	0.102
ROE	-0.009	<b>0.739</b>	0.394	-0.172
DR	-0.170	0.346	0.011	<b>0.758</b>
CR	-0.121	0.022	-0.033	<b>-0.904</b>
GTA	-0.023	<b>0.828</b>	0.011	0.178
GTS	0.031	<b>0.684</b>	0.026	0.182
TCS	<b>0.995</b>	-0.001	0.027	-0.019
TA	<b>0.993</b>	0.007	0.038	0.011
Eigenvalues	2.592	2.052	1.536	1.095
Variance (%)	28.801	22.799	17.069	12.171
(Cumulated)	28.801	51.600	68.669	80.840

Tab. 2: The rotated component matrix (HK shares)

Influence factors	The rotated component matrix			
	Profits	Scale	Credits	Prospect
EPS	<b>0.932</b>	-0.038	0.076	0.034
BPS	<b>0.946</b>	0.043	-0.029	-0.059
ROE	-0.080	-0.163	<b>0.317</b>	0.313
DR	0.006	0.095	<b>0.918</b>	-0.018
CR	-0.084	-0.101	<b>-0.883</b>	0.073
GTA	0.014	-0.044	-0.074	<b>0.850</b>
GTS	-0.004	0.011	-0.007	<b>0.850</b>
TCS	-0.063	<b>0.933</b>	0.004	-0.014
TA	0.067	<b>0.920</b>	0.127	-0.076
Eigenvalues	2.095	1.765	1.582	1.422
Variance (%)	23.276	19.610	17.580	15.805
(Cumulated)	23.276	42.887	60.467	76.272

#### 3.3. Multi-regression analysis

Based on the factor analysis, the paper takes the IPO price (P) as the dependent variable, the 4 principle factors extracted in the financial indices, as well as the other 7 factors (IssV, OM, SP, RR, Ind, MST, MR) as the independent variables, and set up the regression model as follows:

$$P = \beta_0 + \beta_1 \text{Scale} + \beta_2 \text{Prospect} + \beta_3 \text{Profits} + \beta_4 \text{Credits} + \beta_5 \ln(\text{IssV}) + \beta_6 \text{OM} + \beta_7 \text{SP} + \beta_8 \text{RR} + \beta_9 \text{Ind} + \beta_{10} \text{MST} + \beta_{11} \text{MR} + \varepsilon \quad (1)$$

$\beta_0$  is the constant of the equation.  $\beta_i$  is the sensitive coefficient of each independent variable ( $i = 1, 2, \dots, 11$ ). Yet  $\varepsilon$  is the stochastic error. Using the econometric model above and applying multi-regression analysis to the IPO stock in China and HK stock markets, the statistical result are drawn in Table 3.

Tab. 3: Regression analysis result in two markets and their significance testing

	A shares		HK shares	
	$\beta$	T value (Sig.)	$\beta$	T value(Sig.)
Constant	22.176	<b>2.555** (0.012)</b>	$\frac{10.90}{5}$	0.891(0.374)
Scale	0.280	<b>3.980*** (0.000)</b>	0.157	<b>2.472** (0.014)</b>
Prospect	0.244	<b>3.931*** (0.000)</b>	0.045	0.748 (0.455)
Profits	0.508	<b>7.870*** (0.000)</b>	0.114	<b>1.865* (0.064)</b>
Credits	-0.030	-0.450(0.654)	0.150	<b>2.374** (0.019)</b>
ln (IssV)	-0.248	<b>-2.522** (0.013)</b>	-0.389	<b>-5.214*** (0.000)</b>
OM	0.050	0.503 (0.616)	0.127	<b>2.119** (0.035)</b>
SP	-0.008	-0.122 (0.903)	0.371	<b>5.465*** (0.000)</b>
RR	0.102	1.583 (0.116)	0.371	<b>5.495*** (0.000)</b>
Ind	0.174	<b>2.478** (0.014)</b>	0.007	0.123 (0.903)
MST	-0.061	-0.964 (0.337)	0.115	<b>1.784* (0.076)</b>
MR	0.019	0.216 (0.829)	0.233	<b>3.552** (0.000)</b>
F value	12.534		9.545	
P value	0.000		0.000	
R <sup>2</sup> (Adj)	0.463		0.315	
D-W	2.633		1.756	

\*, \*\*, \*\*\* mean that they are significant separately under the levels of 0.1, 0.05 and 0.01 (two-tailed).

It shows that: for the both two models, adjusted R<sup>2</sup> values separately equal to 0.463 and 0.315. F values respectively equal to 12.986 and 9.545, whose P values both equal to 0.000, which means the models is generally significant; D-W values respectively equal to 2.633 and 1.756, which shows that there may not exist evident one order autocorrelation of residuals.

For China, of all the 11 influence factors, only 5 factors, which are Scale, Prospect, Profits, IssV and Ind factor, have passed t test under the significant level of 0.05. It illustrates that China's IPO price mainly reflect the internal value of the stock, which means that its IPO pricing is rational in some extent. For HK, of all the 11 influence factors, 7 factors, which are Scale, Credit, IssV, OM, SP, RR and MR factor, have passed t test under the significant level of 0.05. Especially both the Profit factor and MST factor have passed t test under the significant level of 0.1. Study result denotes that the IPO price of HK not only reflects the internal factor of firms, but also various kinds of issue factor and market factor, which illustrates its relative high efficiency in IPO pricing. In other words, in comparison with HK, the IPO pricing efficiency is still limited in China.

#### 4. Summary and conclusions

Based on the empirical study, in comparison with the information structure of the IPO pricing efficiency in China and HK, some useful conclusions can be drawn as follows.

(1) For the internal factor, Scale, Prospect and Profit have significant effect on the IPO price in China. Yet Scale, Credit and Profit have significant effect on IPO

price in HK. It means that the IPO price in both two markets is able to reflect the internal value information of the IPOs. New issues' internal value is the fundamental basis of the IPO price. High IPO pricing efficiency should base on its internal value.

(2) As for the issue factor, only the Issue volume has significant effect on China's IPO price. On the contrary, not only the Issue volume, but also the Sponsors' prestige and Offer method have significant effect on the IPO price of HK. It denotes that comparing with HK, the IPO price in China reflects very little information on the issue factor, which attribute to the absence of underwriters' prestige mechanism and the lack of effective stimulation for the median service institution such as the underwriters, audit institutions etc. It is very essential to perfect the IPO mechanism and promote the effective service role for the median to play, which count for much in the IPO price.

(3) As for the market factor, only the Industry factor has significant effect on China's IPO price. In contrast, the Region factor, Market situation factor and Market risk factor all significantly affect HK's IPO price. It indicates that very limited market information is another factor which constrains our IPO pricing efficiency, resulting in high IPO underpricing level and high pricing risk in the primary market in China. Thus another key point to improve our IPO pricing efficiency is to promote the marketization of China's new issue mechanism and improve market information in IPO price.

(4) In summary, the IPO price of China focuses on the internal factor of firms, but very little information on the issue factor and market factor. However, the IPO price of HK not only reflects the internal factor of firms, but also mirrors various kinds of issue factor and market factor, which reveals the structural discrepancy between the two, due to the different per-

fectibility of IPO mechanism between them. China adopts the approval system only for a few years, whose IPO mechanism has experienced from the examinational pricing mechanism to inquiry mechanism, which is a twist marketized process. Its mechanism needs to be perfected in many aspects. However, Hong Kong adopts and persists in registration for a long history and selects the commixing mechanism as its IPO mechanism, which realizes its highly effective integration of inter and outer resource and information and thus own relative high pricing efficiency. Therefore, the key point drawing from the HK stock market is that it is very essential to improve our new issues' mechanism and conform to the principle of "limited innovation and continuous trial and error" to promote IPO's "registerization and marketization", so as to realize rational integration of inter and outer resource and information for our IPO price.

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