

# **Financing of Transportation Companies In Hong Kong and Mainland China: The Case of Initial Public Offerings**

June 20, 1999

Stephen Gong Xihe<sup>a</sup>

## **ABSTRACT**

The increasing integration of China into the world economy coupled with China's Reform of State-owned Enterprises raises concerns about Chinese transportation industry's ability to finance its growth and meet the demand of international trade. This paper examines for the first time the underpricing and long-run performance of Mainland Chinese and Hong Kong transportation initial public offerings (IPOs) of common stock during the period 1972-1998. A total of 50 IPOs by companies categorized as transportation companies under the UN Standard Industrial Classification system are examined. These companies are on average underpriced by as much as 70.64%, significant at 1% level. Among IPOs of different transport sub-sectors, different levels of underpricing are documented. On regional basis, a sub-sample of 34 Hong Kong listed companies is underpriced by 44.33%, while the remaining 16 Mainland listed companies are underpriced by 126.54%, both significant at 5% level. Simple linear regression and multiple linear regression are conducted for the Hong Kong sub-sample (for which all necessary data is available), and no single independent variable is found to be significant at conventional levels.

Long-run aftermarket performance of 45 of the 50 transportation IPOs is measured over different periods against respective local stock indices. Results suggest that these IPOs significantly underperform the market. Cross-sectional analyses are performed and different patterns are analyzed.

Results of this study confirm the proposition that transportation IPOs are subject to significant underpricing and long-run underperformance. These phenomena, if they persist, may adversely affect the transportation industry's ability to raise equity in stock markets in the future.

---

<sup>a</sup> The author wishes to thank Professor Kevin Cullinane for helpful comments and Stewart Hui for research assistance. This project is funded by University Research Grants of the Hong Kong Polytechnic University.

# Financing Transportation Companies in Hong Kong and Mainland China—The case of Initial Public Offerings

## 1. Introduction

This study is the first of a series of empirical studies of transportation equity issues in Hong Kong and the Chinese mainland.

As a major segment of China's modern economy, the transportation industry has been the spearhead in China's bid to open up to the outside world. The rapid growth of China's transportation sector is exemplified in the phenomenal growth of its ocean fleet, which has grown from 4,000 DWT in 1949 (Heine, 1989) to 22.5 million DWT in 1995. The importance China places on developing its overall transportation network is further evidenced in a recent speech given by Li Peng, the Chinese Premier:

*China plans to build a nation-wide integrated communications and transportation network in accordance with the guiding principles that "railways are the backbone; roads are the foundation; inland waterways, rivers, coastal and ocean transportation resources are fully utilised; aviation is actively developed; efficiency is achieved by combining different strengths; short- and long-haul transportation is combined; there are transport links to and from China and every point on the globe; and the country has a fully integrated and comprehensive network of communications and transport systems."*<sup>1</sup>

The Chinese leaders have also recognised the importance of diversifying operations and ownership of its transportation system. As of the end of 1997, China had over 120 joint-venture sea transport operators and 53 foreign-owned shipping companies or their subsidiaries. Other schemes are also being proposed in order to attract foreign investments in the country's transportation industry: Joint-ventures are encouraged in terminal constructions, leasing and operations; foreign-ownership is allowed in building shippers' piers and dedicated approach; and foreign companies are allowed to establish joint-ventures for the purpose of offering international and national water transport services<sup>2</sup>. In such a socialist stronghold as China, these moves highlight the nation's determination to reform its state-owned transportation system as part of its Reform of the State-owned Enterprises. For years the financial burden to provide transportation services as part of its social welfare system has been too heavy vis-à-vis the country's increasingly severe fiscal constraints<sup>3</sup>.

---

<sup>1</sup> As reported in "China's shipping prospects", CargoNews China, May 01, 1997.

<sup>2</sup> "China's shipping markets continue opening up" (in Chinese), Jiefang Daily, June 15 1998.

<sup>3</sup> He (1998) attributes fiscal constraints as the cause of China's reforms starting in 1978. For further discussions, see He Fan, *Wei Sichang jingji lixian: Dangdai Zhongguo de Caizeng Wenti* (China's Contemporary Fiscal Problems), Beijing: China Today Press, 1998.

Raising equity in the capital markets provides an important alternative source of financing for China's transportation industry. Since the establishment of the two stock exchanges in Shanghai and Shenzhen in 1986 and 1987, respectively, over 20 Mainland Chinese transportation companies<sup>4</sup> have gone public after structural reorganisation<sup>5</sup>. According to Zhao (1998), the combined market capitalisation of these transportation companies increased from 8.4 billion Yuan (1.28% of total stock market capitalisation) in mid 1996 to 57.2 billion Yuan in mid 1998 (2.52% of total stock market capitalisation), an increase of 581% (see Table 1).

In the Hong Kong scene, transportation companies started to raise equity in the stock markets from as early as the 1960's. At present, up to 40 transportation-related companies<sup>6</sup> have gone public (at various times) on the Hong Kong stock exchanges<sup>7</sup>.

Given the size of these public-listed transportation companies and the importance of the transportation system in the Mainland Chinese and Hong Kong SAR economies, it is both possible and illuminating to provide statistically useful evidence on the price performance of transportation equity issues.

So far very few studies have been conducted in this area. This study aims to bridge the gap in existing literature by focusing on examining the underpricing and long-run performance of transportation initial public offerings (IPOs) of common stock in Hong Kong and the Chinese mainland during the period 1972-1998. The rest of the paper is structured as follows. Section 2 presents the purpose of this study in more detail. Section 3 reviews relevant literature. Section 4 describes the data and methodology. Section 5 presents results and discussion. Section 6 summarizes major findings and concludes.

## **2. Purpose of the study and research questions**

A few reasons may be cited for the need for a focused study on transportation equity issues.

Firstly, the stock market is not a uniform market. Public-listed companies come from many different industries. If share prices truly reflect the intrinsic value of the offering companies then the inherently different operating characteristics and management styles of different types of firms will also mean that their price performance (especially at the time of IPO) will behave differently. The existence of overall stock market efficiency,

---

<sup>4</sup> Zhao (1998) includes only 14 companies within the group of transportation companies. See section 4 in this article for definition.

<sup>5</sup> This mainly involves breaking up big cross-provincial shipping companies into smaller regional entities. Ownership has also been diversified by reducing state direct ownership and introducing more local-government- or collective-level ownership. Most Chinese transportation companies included in this study have undergone reorganisation before public-listing. Also see Gong (1997).

<sup>6</sup> Including up to thirteen PRC companies that have issued H shares in Hong Kong.

<sup>7</sup> There were four stock exchanges in Hong Kong before April 1986, after which they merged to form the Stock Exchange of Hong Kong.

even if proven, does not rule out the possibility that inefficiency may exist in certain types of listed companies—Such inefficiency, if recognised, may provide abnormal profit-making opportunities for investors. In addition, the risk-return characteristics of these shares may also provide investors a chance for diversification<sup>8</sup>.

Several industry-specific studies have revealed peculiar features in the price performance of shares of particular sectors. For example, real estate investments trust (REIT) funds are found to be generally overpriced (see for example Ling and Ryngaert, 1997; and Wang, Chan and Gau, 1992). Grammenos and Marcoulis (1996a) find that shipping IPOs are less severely underpriced and shipping funds are even overpriced. Gong (1997) also documents lower levels of underpricing in Chinese shipping IPOs than Chinese shares in general.

The distorting effects that sector-specific shares exert on studies of market efficiency are most evident in Ritter's (1984) study of "hot issues", where the existence of stock market segmentation is first documented. In Ritter's study, the "hot issue" market of 1980 during which many shares experienced huge initial returns was an anomaly explained mainly by the existence of natural resources issues. Further analysis reveals that "fringe" underwriters exploited start-up natural resource firms during the oil and gas boom in 1980 by underpricing their shares by a larger degree during the "hot issue" period. Ritter thus suggests that "issues in a market segment that is subject to monopsony exploitation get the best deal by going public immediately after a hot issue period of high average returns".

The next natural questions to ask are: given the specific features of the transportation industry (eg. high fixed cost to variable cost ratio, and capital intensity, among others), are transportation IPOs also subject to monopsony exploitation, and if so, what is the best timing for them to go public? Is there any significant difference in the level of underpricing and long run performance between transportation IPOs and issues in other industries? Does such difference exist among IPOs in different transportation sub-sectors, for example in water transportation IPOs versus landside transportation IPOs, or in passenger-related IPOs versus freight-related IPOs? If so, what is the economic explanation for such variance? This study attempts to answer some of these questions.

### **3. Literature review**

The following sub-sections review literature related to the underpricing and the long-run performance of IPOs in general, and relevant empirical evidence as provided by some industry-specific studies.

---

<sup>8</sup> This latter aspect is the subject of a separate study by the author which examines the determinants of returns to transportation shares using a larger sample size than the one employed here.

### 3.1. IPO underpricing

Reilly and Hatfield (1969), Stickney (1970), McDonald and Fisher (1972), and Logue (1973) are among the first to document the initial price performance of unseasoned common stock offerings. All find that initial performance is positive, a phenomenon thought to be indicative of market inefficiency. This generated much interest in the finance circle and has resulted in numerous studies of IPOs.

Ibbotson (1975) develops the RATS (returns across time and securities) model to measure the risk and performance of equity new issues during the period 1960-1969. He finds average positive initial performance (at 11.4%). After further analysis, he concludes that “either the offering price is set too low or the investors systematically overvalue new issues at the end of the first month of seasoning”. No definite explanation for the underpricing mystery is given, but Ibbotson shows that the systematic risks of new issues are greater than the systematic risk of the market, and the systematic risks of securities drop as the issues become seasoned. Ibbotson also suggests the possible existence of information asymmetry between issuers and underwriters.

Baron (1982) takes up Ibbotson’s last suggestion and proposes that investment bankers have superior information about the demand for the new issues than the issuers themselves, and for this reason the bankers are inclined to expend less efforts marketing the new issue by negotiating a lower than clearing offer price. The explanatory power of this theory was cast into doubt by Muscarella and Vetsuypens (1989) who found significant underpricing among investment banks going public.

Rock (1986) proposes a “winner’s curse” explanation for the underpricing of IPOs. Rock’s model assumes two categories of investors: a group of completely informed investors and a group of uninformed investors as to the true value of the new issues. Informed investors only bid for shares that are underpriced, while uninformed investors would bid for all issues. The stock rationing system will mean that on average uninformed investors are allocated a larger proportion of overpriced issues than underpriced issues. Thus they face a winner’s curse: if the uninformed investors receive any shares, they are mostly those that the informed investors do not want. Given this adverse selection problem, uninformed investors will only submit orders if new issues are on average underpriced. This is to compensate them for the bias in the allocation of new issues. A few other studies (see for example Beatty and Ritter, 1986; Koh and Walter, 1989; Keloharju, 1993; Michaely and Shaw, 1994) tested and basically confirmed Rock’s explanation.

Tinic (1988), Hughes and Thakor (1992), Drake and Vetsuypens (1993) examine the phenomenon of underpricing from an “legal avoidance” point of view. The hypothesis is that underpricing of new issues is to avoid legal liabilities for overpricing the issues. Evidence provided by these studies are however not conclusive and are consistent with other propositions.

Allen and Faulhaber (1989), Welch (1989) and Grinblatt and Hwang (1989) propose that firms underprice their issues intentionally to signal their high value so that investors will be induced to take up secondary offerings from the same firms at a higher price than would otherwise be the case. In this way the loss from the initial underpricing can be offset by gains from secondary offers. Studies by Garfinkel (1993), Jegadeesh, Weinstein and Welch (1993) however do not support the hypothesised relationship between initial underpricing and subsequent secondary issues, casting doubt on the empirical power of signalling as a reason for underpricing.

Other theories such as “the stabilisation hypothesis”, “the regulatory constraint hypothesis”, “the market incompleteness hypothesis”, and “the fads hypothesis” have been developed in the finance literature to explain the phenomenon of IPO underpricing. Ibbotson and Ritter (1995) present a summary of these, noting that “Many of the above explanations for the underpricing can be criticised on the grounds of either the extreme assumptions that are made or the unnecessarily convoluted stories involved”. Thus far, it can be said that no single conceptual framework has been developed to fully account for the interesting phenomenon of IPO underpricing.

There is nevertheless overwhelming evidence of IPO underpricing in most countries and in most industries, but the magnitude of such underpricing varies over time, over country and over industries (see Table 2). The cost of external financing through equity offerings is increased, the higher the level of underpricing. However, the loss (through transfer of wealth) an issuer suffers during an IPO may be mitigated if lower returns are earned in the longer-term aftermarket (Ritter, 1991). Therefore, to find out the issuer’s actual costs of raising equity in the public market, it is necessary to extend the period of study into the longer-term aftermarket.

### **3.2. Long-run performance of IPO**

Numerous studies have been carried out to examine the longer-run performance of IPOs.

Ibbotson (1975) studies the excess returns to IPOs with an offer price of at least \$3.00 per share, using one offer per month for a 10-year period from 1960-1969. He finds that IPOs underperformed by an average 1% per month in the second through fourth years of public trading, but that these IPOs had positive excess returns in the first year and fifth (last) year.

Buser and Chan (1987) examine 1078 US IPOs in the period 1981-1985. Using the NASDAQ Composite Index as the benchmark, they find a mean 2-year market-adjusted return of 11.2% exclusive of the initial return, which is 6.2%. Thus, no long-run underperformance is found with this sample.

Ritter (1991) finds that IPOs during the period 1975-1984 underperformed matching firms by 15% (measured from the offering price) after 36 months of initial trading. When measured from the first day closing price, underperformance is even more dramatic.

Interestingly, the study also finds that long-run underperformance is concentrated among firms that went public during the heavy-volume years of the early 1980s, and for younger firms. Levis (1993) obtained similar magnitudes of underperformance in his study of 712 UK IPOs that went public between 1980-1988.

Loughran and Ritter (1995) report underperformance of 4753 US IPOs listed between 1970 and 1990. They find that these IPOs produce an average return of only 5% per year (measured from the first day closing price), as opposed to an average 12% return per year for seasoned issues of matching firms.

Weiss (1989) studies 64 closed-end funds which went public during the period 1985-1987 and finds a -15.05 cumulative index-adjusted return for the first six months of trading.

Other international evidence is also provided on the long-run performance of IPOs, for example in Uhlir (1989) for Germany IPOs, Aggarwal, Leal and Hernandez (1993) for Brazilian and Chilean IPOs, Keloharju (1993) for Finnish IPOs, Firth (1997) for New Zealand IPOs, and Cai & Wei (1997) for Japanese IPOs. All these studies have reported underperformance of IPOs (by different magnitudes) in the long run. Table 3 presents a summary of some of these studies.

A few theories have been developed to account for the phenomenon of IPO long-run underperformance.

Miller (1977) proposes that there is a divergence of opinion among investors about the value of IPOs: some are optimistic; some are pessimistic. The former group of investors tends to place higher values on IPOs than the latter category of investors and may prop up the market price in the beginning days of trading. As more information gradually arrives, the opinions of both groups of investors will converge, and the market price of IPOs will then drop, thus resulting in long-run underperformance.

Shiller (1990) hypothesises that investment bankers underprice IPOs intentionally to create a false impression of excess demand on investors. Shiller thus predicts that IPOs that had the highest initial returns will tend to underperform more than those with the lowest initial returns. This seems to be supported by some empirical studies (see for example Ritter, 1991).

Ritter (1991) and Loughran and Ritter (1995) propose that issuers of IPOs attempt to take advantage of investors sentiments (“windows of opportunities”) by timing their issues at a time when investors are especially optimistic about the growth potential of IPOs (and thus willing to overpay for such issues). This model predicts that IPOs will underperform in the long term.

Ibbotson and Ritter (1995) warn against the tentative nature of evidence on the long-run performance of IPOs. As long-run returns involve long holding periods, the evidence involves firms with overlapping observations. Thus, the number of independent

observations is limited. Consequently, it is possible that the patterns reported in the literature may be the result of common factors that are unlikely to be repeated.

### **3.3. Industry-specific studies of IPOs**

In addition to many market-wide studies of IPO underpricing, there have been a few industry specific studies of IPOs that provided only mixed evidence on the aftermarket performance of a few industries.

Ling and Ryngaert (1997) find that Real Estate Investment Trust (REIT) IPOs in the 1970s and 1980s were initially overpriced. However, equity REIT IPOs in the 1990s have been underpriced. The authors attribute the initial underpricing of these latter IPOs to greater valuation uncertainty and greater initial involvement.

Wang, Chan and Gau (1992) find an average initial return of  $-2.8\%$  for 87 REIT IPOs during the period 1971-1988, which means the REIT IPOs are overpriced. The benchmark adjusted cumulative returns of these IPOs (over 189 days post listing) is also negative, at  $-8.9\%$ , which indicates underperformance.

Neuberger (1991), Kane and Haluk (1988) study the risk-returns characteristics of the US banking sector, while Gyourko and Donald (1993) examine the US real estate sector. All studies reveal industry-specific features.

The first study of shipping equity issues was that of Grammenos and Marcoulis (1996a) who focus on examining 31 shipping IPOs that appeared in seven countries during the period 1983-1995. They find a significant mean initial day return of  $5.32\%$ . This lower level of underpricing in shipping IPOs is attributed to less information asymmetry in shipping than in a typical IPO, as there exists a liquid secondary market for ships worldwide. Their study also finds that initial underpricing is positively related to pre-IPO debt level of the shipping firm and to the proportion of equity offered.

Grammenos and Arkoulis (1997) examine the performance of 27 shipping IPOs in seven countries for the initial 24 months of secondary trading. The portfolio of IPOs are found to underperform respective local stock market indices by as much as  $36.9\%$  by the end of the second anniversary of listing, but no underperformance is documented when returns are adjusted against a shipping index. The aftermarket performance of shipping IPOs is found to be driven mostly by industry factors in the longer run, rather than by conditions in each local stock market.

Grammenos and Marcoulis (1996b) and Kavussanos and Marcoulis (1998) respectively examine the determinants of returns to shipping firms and compare water transportation betas with those of other industries. The former study identifies an industry specific factor (the average age of the fleet) plus financial leverage as significant in explaining shipping stock returns. The latter study focusing on US water transportation common



stocks finds that the water transportation industry exhibits significantly lower market risk than the average stock and lower risk than the rail transportation industry. However, water transportation shares demonstrated significantly higher systematic risk than the real estate industry, while its systematic risk is insignificantly different from the other industries (i.e. air transportation, trucks, electricity, gas, and petroleum). Kavussanos and Marcoulis (1998) suggest that further research should be carried out to establish whether results obtained in their study is a US phenomenon or whether it occurs elsewhere.

Gong (1997) adopts a similar approach as Grammenos and Marcoulis (1996a), Grammenos and Arkoulis (1997) and Ritter (1991) and empirically examines 14 shipping IPOs in mainland China and Hong Kong. A mean initial day return of 134% is documented, significant at 5% level. Multiple linear regression identifies “age of company” as the only explanatory factor for the underpricing of the sample of shipping IPOs. When cumulative adjusted abnormal returns (adjusted against respective local stock market indices) and “wealth relatives” (using Equation 9 in this study) are calculated for the sample over 6-month, 12-month and 24-month periods, the shipping IPOs tend to underperform by higher degrees, the longer the period examined. A major shortcoming of this study, however, is its small sample size. The lack of data also made it impossible to match the long-run performance of shipping IPOs against that of an appropriate control group.

#### **4. Data, propositions and methodology**

The sample in this study covers 50 transportation initial public offerings of common stock<sup>9</sup> in Mainland China and Hong Kong during the period 1972-1998. If an issue includes both new issue offered through public offering and private placement, only the new issue portion is considered. In cases where new issues are simultaneously offered to the public in areas outside Mainland China and Hong Kong, only the portions offered to the latter areas are considered<sup>10</sup>.

Forty-six (92%) of the companies in this sample have investments that are classified as transportation under the United Nations Standard Industrial Classification (SIC code 71) and the other four are companies whose business is closely related to transportation activities (three container manufacturing or leasing companies and one shipyard). To be selected, a company must meet one of the following conditions:

1. At least 30% of the company’s average annual sales for the last three years prior to its listing are derived from the above-defined transportation-related operations; or
2. At least 50% of the companies fixed assets at the time of IPO are transportation-related; or

---

<sup>9</sup> Where a Mainland Chinese company issues “A” shares (open only to domestic investors) and “B” or “H” shares (open only to foreign—including Hong Kong SAR--investors), they are counted as two different initial public offerings.

<sup>10</sup> In the regressions that follow, alternative measures are also used.

3. Where a company does not previously exist, the company reports in the IPO prospectus its intention to use at least 50% of its net proceeds from the IPO in transportation-related activities.

From sources available to the author, this sample represents at least 90% of all companies which meet the above definition and which have all the required data.

To test for IPO underpricing, closing bid prices on the first day of trading are collected from DataStream International or stock market reports and verified in Dow Jones News Retrieval and/or Reuters. Other details such as the IPO offering price, the proportion of equity offered, long-term liability to net tangible asset ratio, age of company, and the like are obtained from individual IPO prospectus.

To measure the long-run performance of each stock, closing bid price on the last day of the first partial-month of trading and time-series of subsequent monthly share prices (adjusted for dividend payments and/or splits/rights-issue where applicable) are collected from DataStream International.

#### 4.1. Initial price reaction of transportation IPOs

Following Ritter (1991), for each issue, the following measures are calculated:

The first day raw return of stock  $i$ ,  $R_i$ , is defined as the percentage change from the offering price to the closing bid price on the first trading day:

$$R_i = (P_1 - P_0) / P_0 \quad (\text{Equation 1})$$

Where  $P_1$  is the closing bid price on the first trading day and  $P_0$  is the offer price.

To find the average cross-sectional initial day return ( $\bar{R}$ ) of  $n$  IPOs, the following formula is used:

$$\bar{R} = 1/n \sum_{i=1}^n R_i \quad (\text{Equation 2})$$

To identify the factors associated with initial day abnormal return, simple linear regressions and multiple linear regressions are run using several variables including proportion of equity offered, age of the offering company, pre-issue long-term liability to net tangible asset ratio, market capitalization, reported P/E ratio, and pre-issue stock market sentiments, etc<sup>11</sup> (see Table 5).

---

<sup>11</sup> Some other variables are left out due to lack of available data.

## 4.2. Long-run share performance

The first-month adjusted return of stock  $i$ ,  $AR_{i0}$ , is defined as the realized return from the close of the first trading day to the last calendar day of the first trading month,  $R_{i0}$ , less the equivalent benchmark return  $R_{m0}$ . The time interval of  $AR_{i0}$  therefore, ranges from 1 to 30 calendar days.

$$AR_{i0} = R_{i0} - R_{m0} \quad (\text{Equation 3})$$

The long-run market-adjusted return which assesses the benchmark-adjusted aftermarket performance of stock  $i$  over a period of  $t$  calendar months<sup>12</sup> following the first partial-month of trading,  $AR_{it}$ , is calculated as follows:

$$AR_{it} = R_{it} - R_{mt} \quad (\text{Equation 4})$$

Where  $R_{mt}$  is the benchmark return for the same period  $t$ .

The average benchmark-adjusted return for the portfolio of  $n$  stocks for event month  $t$  is calculated as:

$$\bar{AR}_t = \frac{1}{n} \sum_{i=1}^n AR_{it} \quad (\text{Equation 5})$$

The cumulative adjusted aftermarket return from the beginning of the first full calendar month to event month  $q$ ,  $CAR_{1,q}$  (which implicitly assumes monthly portfolio rebalancing) is the summation of the average benchmark-adjusted returns:

$$CAR_{1,q} = \sum_{t=1}^q \bar{AR}_t \quad (\text{Equation 6})$$

The statistical significance of the CARs in Equation 6 is assessed by:

$$t(CAR_{1,t}) = \frac{CAR_{1,t} * SQRT(n_t)}{SQRT(t * var + 2 * (t - 1) * cov)} \quad (\text{Equation 7})$$

<sup>12</sup> Ritter (1991) defined a month as a 21-trading-day period. For practical purposes calendar months are used in this study (also see Grammenos and Arkoulis, 1997).

where  $t$  is the event month,  $n_t$  is number of companies trading in event month  $t$ ,  $\text{var}$  is the average (over the  $t$  period) cross sectional variance, and  $\text{cov}$  is the first order autocovariance of the  $\overline{AR}_t$  series in Equation 5.

As an alternative measure of long-run comparative performance, *holding period returns* or *HPR* (over  $q$  calendar months) are also computed as:

$$HPR_i = \prod_{t=1}^q (1 + R_{it}) - 1 \quad (\text{Equation 8})$$

where  $R_{it}$  is the raw return to stock  $i$  in event month  $t$ . This measures the total return from a buy and hold strategy where an IPO is purchased on the first day of the first full calendar month and held until the earlier of either the end of  $q$  months or its delisting. In order to interpret this HPR, Wealth Relatives (WR) are computed as:

$$WR = (1 + \text{mean HPR on IPOs}) / (1 + \text{HPR on bench-mark}) \quad (\text{Equation 9})$$

A Wealth Relative of greater than 1 is interpreted as evidence of IPOs outperforming the respective benchmark, whereas a value below 1 indicates underperformance.

Various benchmarks are used to adjust for market movements during each period, and the resultant market-adjusted return denotes net return to the investor of a stock. If the cumulative adjusted return (CAR of Equation 6) is significantly positive, that means the stock has outperformed the market, and investing in this stock gives the investor an above-average return<sup>13</sup> (taking return-to-benchmark as the average). Benchmarks chosen for this purpose are those indices that represent local stock market movements in which the share is listed (see Table 4). Industry indices (such as Morgan Stanley Capital International index for shipping as used by Grammenos and Arkoulis, 1997) are not used in this study because it is doubtful that they reflect truly comparable investment opportunities for investors of IPOs. Despite the popular use of control group (see for example Ritter, 1991 and Levis, 1993) it is not adopted in this study for two reasons: Firstly, there does not seem to be any better control group than the respective stock market indices. Secondly, an appropriate group of matching firms similar in size and other aspects to transportation IPOs is almost non-existent in the local context.

---

<sup>13</sup> An implied assumption regarding systemic risk is that the beta coefficient is equal to unity even though several studies (see, for example Ibbotson, 1975) have found a higher than 1 average beta for newly-listed firms. Such an assumption is unlikely to affect the essence of the study and the resultant measures of abnormal returns based on IPO beta of 1 are likely to provide conservative estimates of IPOs' underperformance. See Levis (1993).

## **5. Empirical Findings of the Aftermarket Performance of Transportation IPOs**

### **5.1. Underpricing of Transportation IPOs: the facts**

Exhibit 1 presents a summary of un-adjusted initial-day returns calculated in Equation 1. It can be seen from Panel A that underpricing (i.e. positive initial day return) of the shares in both Hong Kong and Mainland China is statistically significant. On average, an investor could have made a paper profit of 70.64% on the first day of trading by selling the transportation IPO shares he acquired at the offer price. The level of underpricing is less severe in Hong Kong (44.33%) than in Mainland China (126.54%), as is true with variability. These findings conform to existing studies that initial public offerings tend to be underpriced.

The magnitude of underpricing documented for Mainland Chinese transportation IPOs appears to be midway in comparison with findings of Mok (1994), who documented raw average price relatives (APR) of 3.847 and 1.245 respectively for Chinese “A” and “B” shares (respectively 284.7% and 24.5% in my equation 1) for the period 1990-1993. But all these figures are dwarfed by the 948.59% average initial day raw return documented by Su and Fleisher (1997) for Chinese IPOs for the period 1987-1995. Possible explanations for such differences may lie with the different samples used and the different time periods examined. Nevertheless, all findings (which are unaffected after adjusting for market movements, as reported in Exhibit 2 of this study) confirm the existence of significant underpricing in Mainland Chinese IPOs in all periods and for all samples under investigation.

In Hong Kong’s case, 43.98% benchmark-adjusted initial day return appears to be on the high side when compared with the average market adjusted initial day returns of 13.8% for the period 1978-1983 and 18% for the period 1980-1990, documented by Dawson (1987) and McGuinness (1992), respectively. This higher abnormal return is also accompanied by a high standard deviation at 114.76%. In all cases, underpricing is found to be significant.

To gain a better view of the cross-sectional level of underpricing, Panel B and Panel C in Exhibit 1 compute average initial day raw returns by nature of service and by group (freight versus passenger transport).

The result in Panel B confirms the proposition that water transportation IPOs are subject to more severe underpricing than other types of transportation IPOs (with the exception of landside transportation companies). This may be accounted for by several reasons. Firstly, while they carries up to 80% of the world’s total trade in terms of ton-miles, water transport companies (with freight income being the main source of revenue) are generally more susceptible to adverse movements in macro-economic factors, as demand for transport is derived demand. Volatile freight rates and the resultant variability in

earnings and asset values are perceived as a serious business risk. Secondly, water transport is generally less well known to the general public than landside and air transport, and is usually treated as a secretive and private business. For these reasons, a water transportation company's intrinsic value is more difficult to evaluate and is thus perceived as more risky. Consequently, a higher level of initial returns is required to compensate investors for the higher level of ex ante uncertainty involved in evaluating a water transportation IPO (see for example Rock, 1986).

Panel C also confirms the general perception of higher risks in freight-related companies as compared with passenger-related companies. Unlike the derived demand nature of freight transport, demand for passenger transport is easier to forecast and revenues are more stable (especially when franchise is involved). Consequently, the intrinsic value of passenger-related transportation IPOs is easier to evaluate than that of freight transportation IPOs. The result is less ex ante uncertainty and a lower level of underpricing is required.

Thus, empirical evidence provided by the above results seems to support the proposition that more risky issues are generally subject to higher levels of abnormal initial day return. However, such evidence does not answer the question: Are these IPOs intentionally offered below market clearing price, or do investors pay too much for them in the first place? In order to answer this question, it is helpful to examine whether any particular factors are associated with abnormal initial returns and whether there is any pattern in the initial underpricing and subsequent longer-term performance of these IPOs.

## 5.2. Underpricing tests

To identify the factors that are likely to be associated with underpricing, simple linear regression and multiple linear regression are performed using variables (see Table 5) that are considered important in the valuation of a new issue and for which data is available<sup>14</sup>. Only a sub-sample of IPOs listed in Hong Kong is used since some data for Mainland Chinese IPOs are not available. Results of the simple linear regressions are presented in Exhibit 3.

Nine out of the twelve independent variables thought to be associated with the level of underpricing have the expected signs. Several findings are note-worthy.

Firstly, no single independent variable is significant at the conventional (95%) level. "Portion of equity offered" and "Prospective dividend yield" are marginally significant at 90% level. R-squared (representing the ability of the independent power in explaining

---

<sup>14</sup> All data are obtained from IPO prospectus. An implicit assumption underlying such tests is that investors decide what aftermarket price to pay for the new issues based on their own evaluation using some of the factors listed in Table 5. This however does not rule out the possibility that issuers and/or underwriters intentionally underpriced the new issues. In the absence of this assumption, some of the expected signs in Table 5 may not be appropriate.

variation in the dependent variable) is extremely low in all regressions, indicating the existence of very large random errors and the weak predictive power of the variables.

Secondly, the variable “Proportion of equity offered”, when measured in different ways, presents conflicting results. There seems to be no economic explanation for such results.

The lack of explanatory power of these independent variables for the level of underpricing suggests that investors may not have relied on fundamental analysis of company information as embodied in the above-listed variables when valuing a new issue. An alternative explanation may be that since these issues are spread over such a long interval (1972-1997), different economic and stock market conditions and investor perception (not captured by these variables) may have weakened the statistical power of these variables<sup>15</sup>.

To see if ALL variables together may have higher predictive power, multiple linear regression is performed with all the afore-said variables and results are presented in Exhibit 4. R-squared increases to 0.28, indicating an increase (albeit insignificant) in the combined explanatory power of these variables.

### **5.3. Long-run Aftermarket Performance of Transportation IPOs**

Results from the previous section do not support the proposition that large positive initial day returns of IPOs may be caused by rational investor behaviour through fundamental analysis of accounting data. Quite to the contrary, the existence of large random errors in both simple linear regression and multiple linear regression suggests that investors may have reacted irrationally on initial trading days. To arrive at any useful conclusion about investor behaviour, it is necessary to examine the aftermarket performance of these IPOs in the longer term.

Exhibit 5 reports statistics for first partial-month returns (both raw and adjusted) of 45 out of the 50 IPOs for which necessary data are available. As can be seen, abnormal returns are eliminated by the end of the first partial trading month, indicating that investors can no longer make abnormal profits by selling transportation shares that they have bought at the first-day closing price. It may thus be concluded that the transportation IPOs are efficiently priced in the immediate aftermarket despite initial mispricing. This result is consistent with Miller and Reilly (1987).

If all abnormal-profit taking activities can be eliminated in the first few days of trading, how then do IPOs perform in the longer term as more and more information arrives? Exhibit 6 reports cumulative average adjusted returns (CARs) for the entire sub-sample of 45 firms for which data is available. Separate CARs are also calculated for the

---

<sup>15</sup> If this is true, the phenomenon of significant IPO underpricing over an extended period of time across almost all countries and industries is even more puzzling.

Mainland Chinese sub-sample (16 firms) and the Hong Kong sub-sample (29 firms) and results are presented in Exhibit 7 and Exhibit 8, respectively.

Results from Exhibit 6 indicate that there is no evidence of either significant underperformance or outperformance for the sample of 45 transportation IPOs during the first 12 months of trading. This, in combination with evidence from Exhibit 5, suggests that transportation IPOs were efficiently priced at least in the first 12-month aftermarket.

On a regional level, the 29 Hong Kong-listed IPOs displayed no underperformance until the 14th month; thereafter CARs are significantly negative<sup>16</sup>. On the other hand, the sample of 16 China-listed IPOs does not display underperformance throughout the first 12 months of trading<sup>17</sup>.

To facilitate comparison with other studies (for example, Ritter, 1991 and Grammenos and Arkoulis, 1997), Wealth Relatives are also calculated using Equation 9 for the first 12-month period. The rest of the discussions in this study focus on examining Wealth Relatives as the only relevant measure of performance.

Results in Exhibit 9 indicate that there is some evidence that the sample of 45 IPOs slightly underperform respective benchmarks: the average holding period return for the sample is 88.8% in the first 12 months after going public, while the benchmarks produce a average 98.8% holding period return over the same period. On regional basis, the Mainland-listed companies only slightly underperform benchmark indices, whereas the Hong Kong sub-sample tends to underperform more severely (with Wealth Relative dropping to 0.84 from 0.94) as the period of observation is extended from 12 months to 15 months, broadly in line with previous findings using CARs.

#### **5.4. Cross-sectional Patterns in the Aftermarket Performance of IPOs**

To investigate possible explanations for the long-run performance of transportation IPOs, this section examines the Wealth Relatives of different categories of IPOs in order identify any particular patterns.

##### **5.4.1. Aftermarket performance categorized by initial day returns**

Exhibit 10 reports the average 12-month holding period returns (HPR) and Wealth Relatives for IPOs segmented by initial day raw returns. IPOs that experienced negative initial returns (i.e. those that were overpriced) turn out to perform the best in the long run,

---

<sup>16</sup> CARs are also computed for the Hong Kong sample up to month 36 (with only 12 observations left) and are found to be significantly negative from month 16 to month 36 (details are omitted here but are available from author).

<sup>17</sup> As many of these Chinese IPOs have a relatively short history in the stock exchange, it is not possible to perform analysis for longer periods of time.



with average 12-month HPR at 1.16 and a Wealth Relative of 1.11. Companies that experienced higher positive initial return tend to have lower holding period returns and lower Wealth Relatives. For example, companies that had 0.00-9.99% initial day returns had a Wealth Relative of 0.93 (signifying slight underperformance), while companies that had much higher initial day returns (>60%) has a Wealth Relative of only 0.87.

Evidence presented in Exhibit 10 thus supports the hypothesis that initial public offerings that have the highest initial day returns also have the worst performance in the long run.

#### **5.4.2. Aftermarket performance categorized by nature of business**

Results in Exhibit 1 and Exhibit 2 indicate that significant difference exists in the level of initial returns for transportation IPOs of different business types. To test the hypothesis that the IPOs of different business types also display different patterns in long-run performance, Exhibit 11 reports the long-run performance of IPOs based on business types.

One outcome is particularly noteworthy: Freight-related IPOs perform as well as the market, and non-freight (including passenger) related IPOs considerably underperformed the market. This is in interesting contrast with findings documented in Panel C of Exhibit 1, where freight-related IPOs experienced a much higher level of initial returns (105%) than passenger-related IPOs (19%, insignificant even at 90% level). It seems that freight transport equities that have been underpriced at the time of IPO are positively re-evaluated by investors in the longer aftermarket period so that their performance track the market more closely. In contrast, passenger transport equities are correctly priced at the time of IPO but subsequently perform worse than the market in the long run. It would be interesting to examine the performance of these two categories of shares beyond the 12 months period as they mature.

## **6. Summary and Conclusions**

This study for the first time examines the underpricing of 50 transportation initial public offerings listed in Hong Kong or the Chinese mainland during the period 1972-1998. The long-run performance of a reduced sample of 45 firms (listed in the period 1991-1998) is also examined. Major findings of the study are summarized as follows.

Significant underpricing (at 70.64%) is documented for the entire sample of transportation IPOs but the magnitude of underpricing is less than that documented by other studies of the general stock markets in the same regions. The use of different samples and the different time period under investigation may be cited as some of the reasons for such different results. There is evidence that freight-related IPOs are subject

to more underpricing than non-freight related IPOs, and that water-transport IPOs are underpriced more than IPOs of other business types. These findings are consistent with transport economic theories and are supportive of Miller's (1977) "divergence of opinion" theory (but not to the exclusion of other theories) in finance.

Underpricing tests using simple linear regression and multiple linear regression fail to identify any variable that is significantly associated with underpricing at conventional levels. This result suggests that investors may not have acted rationally in the sense that they did not seem to rely on fundamental analysis of supposedly useful accounting figures in first-day trading. This however does not rule out other possibilities since not all conceivable variables are included in the study.

If investors do not actually adopt fundamental analysis in evaluating IPOs, or if issuers intentionally undercharge investors for their shares then there will be no reason why any single variable or any combination of variables should be statistically associated with the underpricing phenomenon. If initial performance is the only evidence to be relied on, it seems quite impossible to determine whether underpricing arises because of "fads and overoptimism" (Shiller, 1990), or whether issuers intentionally undercharge for their shares (Ibbotson, 1975). One needs to go beyond the initial return period and examine the long-run aftermarket performance of the initial offerings.

Analysis of the first partial-month adjusted returns of these IPOs implies that opportunities for abnormal profit-making are eliminated by the end of the first partial trading month. This indicates that investors are able to correctly price transportation new shares in the immediate aftermarket. Further analysis using cumulative adjusted returns and Wealth Relatives calculated for the 12-month-period after the first partial month of trading supports the proposition that transportation IPOs underperform (but only slightly) the market. One dollar invested in transportation IPOs would have rolled up to \$1.88 at the end of the first 12 months after public trading, while \$1 invested in the market index will have become \$1.98 over the same period.

Cross-sectional analysis of Wealth Relatives for different categories of offering companies identifies several peculiar patterns. Companies that experienced significantly positive initial returns tend to underperform the market more, the higher their initial returns. Ocean freight-related companies tend to underperform the market in the long run, despite their higher initial returns. Both pieces of evidence seem to support the proposition that investors who had been over-optimistic in the initial market (paying higher than the offering price for shares) revise their opinion of the companies' value in the aftermarket, and this causes shares prices to plunge (hence underperformance).

Evidence from this study suggests that even though transportation IPOs are subject to underpricing at the time of offering, the cost of external equity financing for issuers is lowered in the long term to the degree that low returns are earned in the aftermarket (Ritter, 1991). In modern portfolio theory (see for example Elton and Gruber, 1995), however, low returns *per se* do not tell investors the whole story: It is essential that every security be viewed in a portfolio context (Sharpe, 1985: 119). If low returns are also

accompanied by low risks, then these shares may still represent attractive investment opportunities if they fall within investors' optimal portfolios. The risk-returns characteristics of transportation shares deserve a separate study in its own right.

# APPENDIX A

Table 1. Statistics of listed Mainland Chinese transportation (14) companies (1996-1998)

Year	Issu'd capital (in 100m shares)	Total market value (in 100m Yuan) / % of stock market ttl.		Negotiable capital (in 100m shares)	Total market value of negotiable capital / % of stock market total		Total transaction turnover (in 100m Yuan) / % of stock market total		Stk liquid -ity (%)	Mean daily stock price	Mean P/E ratio
Mid-1996	8.3	84	1.3	2.6	22.8	1.5	43	1.2	10.8	8.8	77.5
End-1996	13.8	141	1.3	4.0	36.3	1.4	263	1.5	31.6	8.9	87.4
Mid-1997	21.9	273	1.6	6.1	71.9	1.6	313	1.6	25.5	11.7	103
End-1997	72.3	553	3.1	9.6	96.2	2.1	202	1.9	11.0	10.0	101
Mid-1998	77.8	571	2.5	11.9	113	1.9	252	1.9	9.9	9.5	64.7

Source: Zhao (1998), p. 56.

Table 2. International Evidence on Short-Run IPO Underpricing

Country	Sample size	Period	Average Initial Return
Australia	266	1976-89	11.9
Belgium	28	1984-90	10.2
Brazil	62	1979-90	78.5
Canada	258	1971-92	5.4
Chile	19	1982-90	16.3
Finland	85	1984-92	9.6
France	187	1983-92	4.2
Germany	172	1978-92	11.1
Greece	79	1987-91	48.5
Hong Kong	80	1980-90	17.6
India	98	1992-93	35.3
Italy	75	1985-91	27.1
Japan	472	1970-91	32.5
Korea	347	1980-90	78.1
Malaysia	132	1980-91	80.3
Mexico	37	1987-90	33.0
Netherlands	72	1982-91	7.2
New Zealand	149	1979-87	28.8
Portugal	62	1986-87	54.4
Singapore	128	1973-92	31.4
Spain	71	1985-90	35.0
Sweden	213	1970-91	39.0
Switzerland	42	1983-89	35.8
Taiwan	168	1971-90	45.0
Thailand	32	1988-89	58.1
UK	2133	1959-90	12.0
US	10626	1960-92	15.3

Source: Ibbotson and Ritter (1995) Table 1.

Table 3. International Evidence on Long Run IPO Overpricing

Country	Sample size	Time period	Length of aftermarket period	Total abnormal return from	
				Offer price (%)	Early market price (%)
Australia	266	1976-89	3 years	n.a.	-46.5
Brazil	62	1980-90	3 years	n.a.	-47.0
Chile	28	1982-90	3 years	n.a.	-23.7
Finland	79	1984-89	3 years	-10.6	-21.1
Germany	119	1974-89	3 years	n.a.	-12.8
Sweden	162	1980-90	3 years	n.a.	+1.2
U.K.	712	1980-88	3 years	n.a.	-8.1
U.S.	4753	1970-90	3 years	n.a.	-17.0

Source: Ibbotson and Ritter (1995) Table 2.

Table 4. Benchmarks used to adjust for market movement of transportation shares

<b>Type of shares</b>	<b>Benchmark index</b>
Hong Kong-listed shares	Hang Seng All Shares Index
Shanghai-listed "A" shares	Shanghai A Shares Index
Shanghai-listed "B" shares	Shanghai B Shares Index
Shenzhen-listed "A" shares	Shenzhen A Shares Index
Shenzhen-listed "B" shares	Shenzhen B Shares Index

Table 5. Factors associated with initial day return and expected signs

<b>Factors associated with initial day return</b>	<b>Expected relationship with initial day return</b>	<b>Rationale</b>
Proportion of equity offered as % of shares in issue	Negative	Investors may believe that issuers would retain higher proportions of their shares if they (as insiders) put high value on them, and vice versa.
Pre-IPO long term liability/net tangible asset ratio	Negative	The higher a firm is leveraged, the more risky it is regarded and therefore the less willing investors are to buy the new issue at the offer price on first trading day.
Issuing costs as % of gross proceeds	Negative	Such costs represent dilution of shareholder wealth.
Log (1+ age of offering company)	Positive	Well-established firms are better known (thus easier to value), and are more likely to be profitable.
Reported P/E ratio (based on offer price)	Negative	Expected higher earnings at a given offer price (hence lower P/E) denote shorter time required to recoup investment.
Log(post-IPO Market capitalization <sup>18</sup> )	Positive	Bigger companies may have higher earning power and there are less risky.
Pre-issue stock market sentiment <sup>19</sup>	Positive	Investors tend to be more optimistic during bullish markets.
Log (1+No. of uses of proceeds)	Negative	The more the reported number of uses, the more liability/risk is perceived (other things being equal).
Discount <sup>20</sup>	Positive	An issue offered at a discount is considered an attractive investment.
Prospective dividend yield (DY)	Positive	The higher the expected dividend payment, the more attractive an issue is (other things being equal).
Profit margin <sup>21</sup>	Positive	Higher profit margins may be considered as a sign of higher future profitability.

<sup>18</sup> Defined as total shares outstanding after IPO multiplied by offering price, calculated in 1990 constant dollars.

<sup>19</sup> A dummy variable is used here: it takes on the value of 1 if the cumulative return to the relevant stock market index (see Table 4) is positive, otherwise it equals 0.

<sup>20</sup> An issue is considered as offered at a discount if the offer price is lower than the net tangible asset value per share (the “floor price”) as reported in the prospectus.

<sup>21</sup> This is taken as the arithmetic mean of ratios of net profit attributable to shareholders over gross revenue (or gross profit in a few cases where the former is not available) over the three (two in some cases) years prior to public-listing.

Exhibit 1. Summary statistics of initial-day raw returns

Panel A. Initial day raw returns by region

	Number of observations	Mean under-pricing (%)	Standard deviation%	t-statistic(1) (one-tailed)
ALL	50	70.64	161.40	3.09***
HK	34	44.33	114.93	2.25**
Mainland China	16	126.54	226.12	2.24**

Panel B. Initial day raw returns by nature of business

	Number of observations	Mean under-pricing (%)	Standard deviation%	t-statistic(1) (one-tailed)	t-statistic(2) (one-tailed)
Water-transport firms	23	126.04	220.02	2.75**	
Toll roads	10	12.19	31.35	1.23	2.43**
Freight forwarders	6	6.20	23.58	0.64	2.56***
Airlines	4	5.71	5.96	1.92	2.62***
Landside transport	7	64.45	93.87	1.82	1.06

Panel C. Initial day raw returns by group--freight versus passenger

	Number of observations	Mean under-pricing (%)	Standard deviation%	t-statistic(1) (one-tailed)	t-statistic(3) (one-tailed)
Freight-related firms	30	104.95	198.97	2.89***	
Passenger-related firms	20	19.17	45.89	1.87	2.27**

t-statistic (1) tests the null hypothesis that mean initial return is greater than zero.

t-statistic (2) tests the null hypothesis that mean initial return to water-transport firms is greater than mean returns to other types of business in Panel B.

t-statistic (3) tests the null hypothesis that mean initial return to freight-related firms is greater than mean return to passenger-related firms in Panel C.

\*\*\*Significant at 1% level



Exhibit 2. Summary statistics of initial-day benchmark-adjusted returns

Panel A. Initial day raw returns by region

	Number of observations	Mean underpricing (%)	Standard deviation%	t-statistic(1) (one-tailed)
ALL	45	70.70	161.50	2.94***
HK	29	43.98	114.76	2.06**
Mainland China	16	127.48	226.21	2.25***

Panel B. Initial day raw returns by nature of service

	Number of observations	Mean underpricing (%)	Standard deviation%	t-statistic(1) (one-tailed)	t-statistic(2) (one-tailed)
Water-transport	19	126.61	220.02	2.51***	
Toll roads	10	12.19	31.79	1.21	2.20**
Freight forwarders	6	4.89	24.63	0.49	2.35**
Airlines	4	4.47	8.08	1.11	2.36**
Landside transport	6	64.82	92.00	1.86	1.04

Panel C. Initial day raw returns by group--freight versus passenger

	Number of observations	Mean underpricing (%)	Standard deviation%	t-statistic(1) (one-tailed)	t-statistic(3) (one-tailed)
Freight-related firms	26	105.07	199.14	2.69***	
Passenger-related firms	19	19.15	45.54	1.83	2.14**

t-statistic (1) tests the null hypothesis that mean initial return is greater than zero.

t-statistic (2) tests the null hypothesis that mean initial return to water-transport firms is greater than mean returns to other types of business in Panel B.

t-statistic (3) tests the null hypothesis that mean initial return to freight-related firms is greater than mean return to passenger-related firms in Panel C.

\*\*\*Significant at 1% level

\*\*Significant at 5% level

Note: This sample is reduced to 45 observations due to missing data for 5 stocks.

Exhibit 3. Simple linear regression results with initial day return as dependent variable

<b>Independent variables (X)</b>	<b>Intercept</b>	<b>Coefficient</b>	<b>P-value for variable X</b>	<b>R squared</b>
Portion offered	-1.31	2.92	0.09	0.09
Portion offered**	117.22	-2.65	0.44	0.02
Log(MKTCAP)	180.41	-44.67	0.22	0.05
Issuing costs/equity offered	68.09	-2.89	0.43	0.02
Reported P/E ratio	75.89	-2.08	0.27	0.04
LTL/Tangible net asset	52.05	-5.79	0.57	0.01
Market sentiment	8.01	58.81	0.15	0.06
Log(No. of uses)	43.77	0.87	0.99	0.00
Log(1+age)	40.91	7.12	0.15	0.00
Discount/Premium	17.09	0.92	0.17	0.06
Propective dividend yield (DY)	-11.12	12.88	0.06	0.11
Profit margin	32.47	0.41	0.61	0.01

Note: Portion offered is defined as the portion of public offering to Chinese mainland or Hong Kong investors. Portion offered\*\* includes the above plus portions of private placement and/or international offerings.

Exhibit 4. Multiple linear regression results with initial day return as dependent variable

<b>Independent variables (X)</b>	<b>Coefficient</b>	<b>P-value for variable</b>
Portion offered	0.20	0.97
Portion offered**	-54.92	0.60
Log(MKTCAP)	2.65	0.59
Issuing costs/equity offered	-6.44	0.29
Reported P/E ratio	0.84	0.86
LTL/Tangible net asset	1.88	0.89
Market sentiment	39.39	0.45
Log(No. of uses)	108.40	0.59
Log(1+age)	-9.68	0.85
Discount/Premium	1.03	0.60
Propective dividend yield (DY)	-2.18	0.93
Profit margin	1.30	0.34
<b>Intercept</b>	54.05	
<b>R squared</b>	0.28	

Exhibit 5. Descriptive statistics for first partial-month returns

**Panel A. First partial-month raw returns**

	All	HK	China
No. of observations	45	29	16
mean returns (%)	-1.46	0.34	-4.72
standard deviation	13.39	15.31	8.40
t-statistic	-0.730495	0.1194751	-2.24**

**Panel B. First partial-month benchmark-adjusted returns**

	All	HK	China
No. of observations	45	29	16
mean returns (%)	0.16	1.70	-2.64
standard deviation	13.08	14.15	10.73
t-statistic	0.08	0.65	-0.99

\*\*Significant at 5% level

Note: First partial-month adjusted returns are calculated in Equation 3.

Exhibit 6. Long-run (12-month) Abnormal Return for Transportation IPOs in 1991-1998 (excluding initial period returns)

Month of seasoning	Number of firms trading	$\overline{\overline{AR_t}}$	t-statistic	CAR 1,t	t-statistic
1	45	-0.045	-0.72	-0.045	-0.70
2	45	0.012	0.26	-0.033	-0.36
3	45	-0.003	-0.07	-0.036	-0.32
4	45	0.011	0.28	-0.025	-0.19
5	45	-0.080	-0.62	-0.105	-0.72
6	45	-0.006	-0.11	-0.111	-0.69
7	45	0.010	0.21	-0.100	-0.58
8	45	-0.035	-0.56	-0.136	-0.74
9	45	0.017	0.28	-0.119	-0.61
10	45	0.002	0.05	-0.116	-0.57
11	45	0.014	0.19	-0.102	-0.47
12	45	0.018	0.28	-0.084	-0.37

Note:

1. The t-statistic for  $\overline{\overline{AR_t}}$  is calculated as  $\overline{\overline{AR_t}} * \text{SQRT}(n_t) / \text{sd},t$ , where  $\overline{\overline{AR_t}}$  is the average adjusted return calculated in Equation 5,  $n_t$  is the number of observations in month  $t$ , and  $\text{sd},t$  is the cross-sectional standard deviation of the adjusted returns for month  $t$ .
2. The t-statistic for the cumulative average adjusted return in month  $t$ ,  $\text{CAR}t$  is computed as  $\text{CAR}1,t * \text{SQRT}(n_t) / \text{csd},t$ , where  $\text{CAR}$  is calculated in equation 6,  $n_t$  is the number of firms trading in each month, and  $\text{csd},t$  is computed as  $\text{SQRT}[t * \text{var} + 2 * (t - 1) * \text{cov}]$ , where  $t$  is the event month,  $\text{var}$  is the average (over the entire period) cross-sectional variance, and  $\text{cov}$  is the first-order autocovariance of the  $\overline{\overline{AR_t}}$  series.  $\text{Var}$  has a value of 0.1886, and  $\text{cov}$  has a value of 0.00855.

Exhibit 7. Long-run Abnormal Return for Hong Kong Transportation IPOs  
in 1991-1997 (excluding initial period returns)

Month of seasoning	Number of firms trading	$\overline{\overline{AR_t}}$	t-statistic	CAR 1,t	t-statistic
1	29	-0.055	-1.63	-0.055	-1.63
2	29	0.017	0.58	-0.038	-0.79
3	29	-0.016	-0.55	-0.055	-0.91
4	29	-0.018	-0.55	-0.073	-1.05
5	29	-0.036	-0.79	-0.109	-1.40
6	29	-0.038	-1.04	-0.147	-1.72
7	29	-0.004	-0.10	-0.150	-1.63
8	29	-0.023	-0.47	-0.173	-1.75
9	29	0.009	0.18	-0.164	-1.57
10	29	0.026	0.75	-0.138	-1.25
11	29	-0.015	-0.37	-0.153	-1.32
12	29	-0.002	-0.05	-0.155	-1.28
13	29	-0.042	-1.06	-0.196	-1.56
14	29	-0.124	-1.41	-0.321	-2.45**
15	29	-0.005	-0.14	-0.326	-2.41**

\*\*Significant at 5% level.

Note:

1. The t-statistic for  $\overline{\overline{AR_t}}$  is calculated as  $\overline{\overline{AR_t}} * \text{SQRT}(n_t) / \text{sd},t$ , where  $\overline{\overline{AR_t}}$  is the average adjusted return calculated in Equation 5,  $n$  is the number of observations in month  $t$ , and  $\text{sd},t$  is the cross-sectional standard deviation of the adjusted returns for month  $t$ .
2. The t-statistic for the cumulative average adjusted return in month  $t$ ,  $\text{CAR}t$  is computed as  $\text{CAR}1,t * \text{SQRT}(n_t) / \text{csd},t$ , where  $\text{CAR}$  is calculated in equation 6,  $n_t$  is the number of firms trading in each month, and  $\text{csd},t$  is computed as  $\text{SQRT}[t * \text{var} + 2 * (t - 1) * \text{cov}]$ , where  $t$  is the event month,  $\text{var}$  is the average (over the entire period) cross-sectional variance, and  $\text{cov}$  is the first-order autocovariance of the  $\overline{\overline{AR_t}}$  series.  $\text{Var}$  has a value of 0.054925, and  $\text{cov}$  has a value of 0.00122.

Exhibit 8. Long-run Abnormal Return for Mainland Chinese Transportation IPOs in 1992-1998 (excluding initial period returns)

Month of seasoning	Number of firms trading	AR,t	t-statistic	CAR 1,t	t-statistic
1	16	-0.03	-0.45	-0.03	-0.44
2	16	0.00	0.08	-0.02	-0.27
3	16	0.02	0.57	0.00	-0.03
4	16	0.06	2.78	0.06	0.48
5	16	-0.16	-1.03	-0.10	-0.68
6	16	0.05	1.36	-0.04	-0.28
7	16	0.04	1.21	-0.01	-0.06
8	16	-0.06	-1.41	-0.07	-0.37
9	16	0.03	0.99	-0.04	-0.19
10	16	-0.04	-1.39	-0.08	-0.38
11	16	0.07	0.98	-0.01	-0.04
12	16	0.05	0.91	0.04	0.19

Note:

1. The t-statistic for  $\overline{AR}_t$  is calculated as  $\overline{AR}_t * \text{SQRT}(n_t) / \text{sd},t$ , where  $\overline{AR}_t$  is the average adjusted return calculated in Equation 5,  $n_t$  is the number of observations in month t, and  $\text{sd},t$  is the cross-sectional standard deviation of the adjusted returns for month t.
2. The t-statistic for the cumulative average adjusted return in month t,  $\text{CAR}_t$  is computed as  $\text{CAR}_{1,t} * \text{SQRT}(n_t) / \text{csd},t$ , where  $\text{CAR}$  is calculated in equation 6,  $n_t$  is the number of firms trading in each month, and  $\text{csd},t$  is computed as  $\text{SQRT}[t * \text{var} + 2 * (t - 1) * \text{cov}]$ , where t is the event month, var is the average (over the entire period) cross-sectional variance, and cov is the first-order autocovariance of the  $\overline{AR}_t$  series. Var has a value of 0.059803, and cov has a value of 0.0042.

Exhibit 9. Long-run Performance of Transportation IPOs by Place of Listing (excluding initial period returns)

	Number of trading months	Number of trading firms	Wealth Relative
All Issues	12	45	0.95
Mainland China	12	16	0.96
Hong Kong	12	29	0.94
Hong Kong	15	29	0.84

Note: Wealth Relatives are calculated in Equation 9.

Exhibit 10. Long-run (12-month) Performance by Initial-day Returns for Transportation IPOs (excluding Initial Period Returns)

Initial returns (%) category	Number of observations	Average 12-month HPR %	Wealth Relative
<0	10	1.16	1.11
0.00 - 9.99	10	0.85	0.93
10.00 - 29.99	11	0.72	0.90
30.00 - 59.99	5	1.00	0.93
> 60	9	0.77	0.87
All issues	45	0.87	0.95

*Note:* HPR and Wealth Relatives are calculated in Equation 8 and Equation 9, respectively.

Exhibit 11. Long-run (12-month) Performance by Type of Business for Transportation IPOs (excluding initial period returns)

Type of business	Number of observations	Average 12-month HPR %	Wealth Relative
<b>Freight-related</b>	26	1.11	1.01
<i>among which</i>			
<i>Ocean-related firms</i>	19	1.01	0.96
<i>Forwarders</i>	6	1.51	1.14
<b>Non-freight-related</b>	19	0.58	0.86
<i>among which</i>			
<i>Passenger-related firms</i>	9	0.46	0.80
<i>Toll roads/others</i>	10	0.66	0.88

*Note:* HPR and Wealth Relatives are calculated in Equation 8 and Equation 9, respectively.

Appendix B. List of companies included in the study

COMPANY	STOCK EXCHANGE	YEAR LISTED
China Shipping Development Co. Ltd.	Hong Kong	1994
Chu Kong Shipping Development Ltd.	Hong Kong	1997
Cosco Pacific Ltd.	Hong Kong	1994
Guangzhou Shipyard International Co. Ltd.	Hong Kong	1993
*IMC Holdings Ltd.	Hong Kong	1972
Jinhui Holdings Co. Ltd.	Hong Kong	1991
*Orient Overseas (International) Ltd.	Hong Kong	1973
Pacific Ports Co. Ltd.	Hong Kong	1997
*Shun Tak Holdings Ltd.	Hong Kong	1973
Singamas Container Holdings Ltd.	Hong Kong	1993
*Wah Kwong Shipping Holdings Ltd.	Hong Kong	1973
Tianjin Development Holdings Ltd.	Hong Kong	1997
AWT World Transport Holdings Ltd	Hong Kong	1993
Baltrans Holdings Ltd.	Hong Kong	1992
Ideal Pacific Holdings Ltd.	Hong Kong	1994
Jet Air International Group Ltd.	Hong Kong	1996
Vincent Intertrans (Holdings) Ltd.	Hong Kong	1993
Wing Lee World Transport Holdings Ltd.	Hong Kong	1997
China National Aviation Co. Ltd. (CNAC)	Hong Kong	1997
China Eastern Airlines Co. Ltd.	Hong Kong	1997
China Southern Airlines Co. Ltd.	Hong Kong	1997
Citybus Group Ltd.	Hong Kong	1996
*Cross-Harbour Tunnel Co. Ltd.	Hong Kong	1974
Kwoon Chung Bus Holdings Ltd.	Hong Kong	1996
China Travel International Investments HK Ltd	Hong Kong	1992
Anhui Expressway Co. Ltd.	Hong Kong	1996
Guangshen Railway Company Ltd.	Hong Kong	1996
Jiangsu Expressway Co. Ltd.	Hong Kong	1997
Shenzhen Expressway Co. Ltd.	Hong Kong	1997
Sichuan Expressway Co. Ltd.	Hong Kong	1997
Zhejiang Expressway Ltd.	Hong Kong	1997
GZI Transport Ltd.	Hong Kong	1997
New World Infrastructure Ltd.	Hong Kong	1995
Road King Infrastructure Ltd.	Hong Kong	1996
Guangdong Provincial Expressway "A"	Shenzhen	1998
Hainan Nanyang Shipping Industrial Ltd. "A"	Shenzhen	1994
Hainan Haisheng Shipping & Enterprise Co. Ltd.	Shanghai	1996
Shenzhen Great Ocean Shipping Co. Ltd "B"	Shenzhen	1995
Tientsin Marine Shipping Co. Ltd "A"	Shanghai	1996
Tientsin Marine Shipping Co. Ltd "B"	Shanghai	1996
Nanjing Water Transport "A"	Shanghai	1997
Ningbo Marine Ship "A"	Shanghai	1997
China International Marine Container "B"	Shenzhen	1994
Shanghai Iron and Steel Transportation "A"	Shanghai	1993
China Merchant Shekou Port Service "B"	Shenzhen	1993
Shenzhen Chiwan Wharf Holdings "A"	Shenzhen	1993
Shenzhen Chiwan Wharf Holdings "B"	Shenzhen	1993
Hainan Airlines "B"	Shanghai	1997
Shanghai Pudong Qiangsheng Taxi Co.Ltd. "A"	Shanghai	1992
Shanghai Dazhong Taxi Co.Ltd. "B"	Shanghai	1992

\*These companies are not used in the examination long-run performance due to missing data.



## Reference:

Aggarwal, R., Leal, R. and Hernandez, F. (1993) The Aftermarket Performance of Initial Public Offerings in Latin America, *Financial Management* Vol. 22, 42-53.

Allen, F. and Faulhaber, G.R. (1989) Signaling by Underpricing in the IPO Market, *Journal of Financial Economics*, Vol. 23, 303-323.

Baron, D.P. (1982) A Model of the Demand of Investment Banking Advising and Distribution Services for New Issues, *Journal of Finance* Vol. 37, 955-976.

Beatty, R.P. and Ritter, J.R. (1986) Investment Banking, Reputation, and the Underpricing of Initial Public Offerings, *Journal of Financial Economics* Vol. 15, 213-232.

Buser, S.A. and Chan, K.C. (1987) NASDAQ/NMS Qualification Standards, Ohio Registration Experience and the Price Performance of Initial Public Offerings, Columbus, Ohio Department of Commerce and National Association of Securities Dealers, Inc.

Cai, J. and Wei, K.C.J. (1997) The Investment and Operating Performance of Japanese Initial Public Offerings, *Pacific-Basin Finance Journal* Vol. 5, 389-417.

Dawson, S.M. (1987) Secondary Stock Market Performance of Initial Public Offers, Hong Kong, Singapore, and Malaysia: 1978-1984, *Journal of Business Finance & Accounting* (Spring 1987), 65-76.

Drake, P.D. and Vetsuypens, M.R. (1993) IPO Underpricing: Insurance against Legal Liability? *Financial Management* Vol. 22, 64-73.

Elton, E.J. and Gruber, M.J. (1995) *Modern Portfolio Theory and Investment Analysis*, 5<sup>th</sup> Edition, John Wiley & Sons, Inc.

Firth, M. (1997) An Analysis of the Stock Market Performance of New Issues in New Zealand, *Pacific-Basin Finance Journal* Vol. 5, 63-85.

Garfinkel, J. (1993) IPO Underpricing, Insider Selling and Subsequent Equity Offerings: Is Underpricing a Signal of Quality, *Financial Management* Vol. 22, 74-83.

Gong, X.H. (1997) An Empirical Study of Shipping Initial Public Offerings in Mainland China and Hong Kong. MSc. Dissertation. City University Business School, London, U.K.

Grammenos, C.Th. and Arkoulis, A.G. (1997) The Long-run Performance of Shipping Initial Public Offerings. Proceedings, 1997 IAME Conference, City University Business School, London, UK.

Grammenos, C.Th. and Marcoulis, S.N. (1996a) Shipping IPOs: A Cross-country Analysis, in Levis (ed.) *Empirical Issues in Raising Equity Capital*, Amsterdam: Elsevier 1996.

Grammenos, C.Th. and Marcoulis, S.N. (1996b) A Cross-section Analysis of Stock Returns: The Case of Shipping Firms, *Maritime Policy and Management*, 1996 Vol. 23, No. 1, pp. 67-80.

Grinblatt, M. and Hwang, C.Y. (1989) Signaling and the Pricing of New Issues, *Journal of Finance* Vol. 44, 393-420.

Gyourko, J. and Donald, K.B. (1993) Risk and Return in Real Estate: Evidence from a Real Estate Index, *Financial Analysts Journal*, Sept.-Oct., 39-46.

Hedge, S. and Miller, R. (1995) The Informational Role of Debt and the Pricing of Initial Public Offerings, Working Paper (November 1995).

Heine, I.M. (1989) *China's Rise to Commercial Maritime Power*, Connecticut: Greenwood Press, Inc.

Hughes, P.J. and Thakor, A.V. (1992) Litigation Risk, Intermediation, and the Underpricing of Initial Public Offerings, *Review of Financial Studies* Vol. 5, 709-742.

Ibbotson, R.G. and Ritter, J.R. (1995) Initial Public Offerings, in: Jarrow R.A., Maksimovic V. and Ziemba (ed.), *Handbooks in Operations Research and Management Science* (Vol 9): Finance, North-Holland, Netherlands.

Ibbotson, R.G. (1975) Price Performance of Common Stock New Issues, *Journal of Financial Economics* Vol. 2 (1975), pp. 235-272.

Jegadeesh, N., Weinstein, M. and Welch, I. (1993) An Empirical Investigation of IPOs Returns and Subsequent Equity Offerings, *Journal of Financial Economics* Vol. 34, 153-175.

Kane, E.J. and Haluk, U. (1988) Change in Market Assessment of Deposit-institution Riskiness, *Journal of Financial Services Research* Vol. 1, 207-229.

Kavussanos, M.G. and Marcoulis, S. N. (1998) Beta Comparison across Industries--A Water Transportation Industry Perspective, *Maritime Policy and Management* Vol. 25, No. 2, pp. 175-184.

Keloharju, M. (1993) The Winner's Curse, Legal Liability, and the Long-run Price Performance of Initial Public Offerings in the Finland, *Journal of Financial Economics* Vol. 34, 251-277.

- Koh, F. and Walter, T. (1989) A Direct Test of Rock's Model of the Pricing of Unseasoned Issues, *Journal of Financial Economics* Vol. 23, 251-272.
- Levis, M. (1993) The Long-Run Performance of Initial Public Offerings: The UK Experience 1980-1988, *Financial Management*, Spring 1993.
- Ling, D.C. and Ryngaert, M. (1997) Valuation Uncertainty, Institutional Involvement, and the Underpricing of IPOs: the Case of REITs, *Journal of Financial Economics* Vol. 43, 433-456.
- Logue, D.E. (1973) On the Pricing of unseasoned Equity Offerings: 1965-1969, *Journal of Financial and Quantitative Analysis* Vol. 8, 91-103.
- Loughran, T. and Ritter, J.R. (1995) The New Issues Puzzle, *Journal of Finance* Vol. 50, 23-51.
- McDonald, J.G. and Fisher, A.K. (1972) New Issue Stock Price Behaviour, *Journal of Finance* Vol. 27, 97-102.
- McGuinness, P. (1992) An Examination of the Underpricing of Initial Public Offerings in Hong Kong: 1980-1990, *Journal of Business Finance & Accounting* (January 1992), 165-186.
- Michaely, R. and Shaw, W. (1994) The Pricing of Initial Public Offerings: Test of Adverse Selection and Signaling Theories, *Review of Financial Studies* Vol. 7, 279-317.
- Miller, R.E. (1977) Risk, Uncertainty, and Divergence of Opinion, *Journal of Finance* Vol. 32, 1151-1168.
- Miller, R.E. and Reilly, F.K. (1987) An Examination of Mispricing, Returns, and Uncertainty for Initial Public Offerings, *Financial Management* (Summer 1987), 33-38.
- Mok, M.K. (1994) The Aftermarket Performance of IPOs in Shanghai, China, Working Paper Series, The Chinese University of Hong Kong.
- Muscarella, C.J. and Vetsuypens, M.R. (1989) A Simple Test of Baron's Model of IPO Underpricing, *Journal of Financial Economics* Vol. 24, 125-135.
- Neuberger, J.A. (1991) Risk and Return in Banking: Evidence from Bank Stock Returns, *Federal Reserve Bank of San Francisco Economic Review*, 18-39.
- Reilly, F.K. and Hatfield, K. (1969) Investor Experience with New Stock Issues, *Financial Analysis Journal* Vol. 25, 73-80.
- Ritter, J. (1984) The "Hot Issue" Market of 1980, *Journal of Business*, vol. 57, No. 2., 215-240.

- Ritter, J. (1991) The Long-Run Performance of Initial Public Offerings, *Journal of Finance* Vol. 46, 3-27.
- Rock, K. (1986) Why New Issues Are Underpriced, *Journal of Financial Economics* Vol.15, 187-212.
- Sharpe, W.F. (1985) *Investments*, 3<sup>rd</sup> Edition, New Jersey: Prentice-Hall, Inc.
- Shiller, R.J. (1990) Speculative Prices and Popular Models, *Journal of Economic Perspectives* Vol. 4, 55-65.
- Stickney, C.P., Jr. (1970) A Study of the Relationships of Accounting Principles and Common Stock Prices of Firms Going Public. Unpublished Ph.D. dissertation (Florida State University, Tallahassee).
- Su, D.W. and Fleisher, B.M. (1997) An Empirical Investigation of Underpricing in Chinese IPOs, Unpublished Working Paper: Ohio State University (July 1997).
- Tinic, S.M. (1988) Anatomy of Initial Public Offerings of Common Stock, *Journal of Finance*, Vol. XLIII, No. 4 (September 1988).
- Uhlir, H. (1989) Going Public in the F.R.G., in: R. Guimaraes et al. (eds.), *A Reappraisal of the Efficiency of Financial Markets*, Springer-Verlag, Berlin.
- Wang, K., Chan, S.H. and Gau, G.W. (1992) Initial Public Offerings of Equity Securities: Anomalous Evidence Using REITs, *Journal of Financial Economics* Vol. 31, 381-410.
- Weiss, K. (1989) The Post-offering Price Performance of Closed-end Funds, *Financial Management* Vol. 18, 57-67.
- Welch, I. (1989) Seasoned Offerings, Imitation Costs, and the Underpricing of Initial Public Offerings, *Journal of Finance* Vol. 44, 421-449.
- Zhao, X.P. (ed.) (1998) *Zhongguo Gupiao Shichang Tongji Fenxi* (Statistical Analysis of the Chinese Stock Markets), Beijing: Zhongguo Caizheng Jingji Chubanshi (China Financial and Economic Publishing House).