The Causes and Effects of Post-IPO Underperformance in China

Jin Tan[a] and Sunghwan Kim[b]

[a] *Ph.D. Candidate, School of Business Administration, Kyungpook National University, Daegu, South Korea*

[b] *Associate Professor, School of Business Administration, Kyungpook National University, Daegu, South Korea*

A B S T R A C T

In this study, we test whether the initial returns (IR) or the phenomena of underpricing of IPOs is also one of the causes of Post-IPO Underperformance in China. We study the market information effect on the underpricing of IPOs first and study the effect of the other causes of Post-IPO Underperformance such as the Post-IPO initial stock return volatility and lock-up policy. Multivariate regressions are conducted using all the IPOs of firms listed on the Shanghai and Shenzhen exchanges from 1987 to 2015. The main results of this study are as follows.

First, while that the magnitudes of weighted (equally or value weighted) IPO volumes in the past have a positive effect on the magnitude of IPO returns in the future, the IPO volume itself has a negative effect on the magnitude of IPO returns in the future. Second, the magnitude of weighted IPO returns in the past has a positive effect on the magnitude of IPO returns, while simultaneously reflecting the effects of both time-span and magnitude in returns and volume for most of the information used in Lowry and Schwert (2002). Third, in most situation, Post-IPO underperformance following the high initial returns (IR) in China. Fourth, for high lung-run return IPOs, high Post-IPO initial stock return volatility exacerbates the Post-IPO Underperformance while for low lung-run return IPOs, high Post-IPO initial stock return volatility eases the Post-IPO Underperformance. Fifth, the lock-up policy partial eases the Post-IPO Underperformance and the stock return volatility after open-up the locked trading stock can exacerbate the Post-IPO Underperformance.

Keywords: Information Effect; Time-span; Long-run Underperformance; IPO Market Cycles Lock-up; China

I. Introduction

It is well known that the stock price of a firm is too hard to predict accurately, not just the price, but also the direction of the price. However, empirical studies find that newly listed firms underperform on the market for 3 to 5 years after the offering (Ritter, 1991; Loughran and Ritter 1995). This finding is called the 'new issues puzzle' and has attracted a lot of interest academically and in practice. This puzzle is named after the weird phenomena related to IPO underperformance after exorbitant undervaluation of the IPO price. Thus, the 'new issue effect' refers to the observation that stocks of firms that issue new equity are on average very poor investments relative to various benchmarks (Balia, Cakicib and Fabozzi, 2013).

Researchers have reported consistent empirical evidence of post-IPO long-term underperformance in many countries. For example, Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) showed that new issues in the United States are followed by abnormally low stock market returns for the next five years. Fama (1998) argues that underperformance is weak among large firms when it is evaluated using the Fama and French (1993) three-factor model and views these results as normal random variations that can occur even in efficient markets. Maher et al. (2004) examined 445 Canadian IPOs between 1991 and 1998 and found that these IPOs underperformed in the long run. Plus, Balia et al. (2013) found a significantly negative relation between net share issues and expected returns in the United Kingdom and Japan.

According to the empirical research by Ritter (1991), Santos (2010), and Sohn et al. (2012), firms with the greatest underperformance are those with high initial returns at the time of issuance. Thus, in this study, we test whether the initial returns (IR) or the phenomena of underpricing of IPOs is also one of the causes of 'new issue effect' in China. Before that, we study the market information effect on the underpricing of IPOs. In addition, we study the effect of the other causes of Post-IPO Underperformance in China such as the Post-IPO initial stock return volatility and lock-up policy.

An initial public offering (IPO) is one of the best known, or maybe the most important financing methods in corporate finance (Fang, Shi and Xu, 2012). Firms use IPOs as windows of opportunity to reduce the costs of raising capital, and high IPO initial returns are not a surprising phenomenon for the Chinese stock market (Loughran, Ritter and Rydqvist, 1994), although the phenomenon of extremely high IPO initial returns exists in almost every capital market in the world (Agrawal, 2009). While high underpricing is a common phenomenon in most stock markets, in both developed and emerging

economies, it is evidence against market efficiency and can hurt firms trying to raise funds for expansion. Thus, several extensive studies have begun to explore the causes of this apparent anomaly in the IPO market. With a number of theories of IPO underpricing and empirical studies using the data of various stock markets, the anomaly still exists and lasts in most economies. Most previous studies on the determinants of corporate financial decision-making to go public and the consequences of IPOs in the free capital market report that firms tend to issue equity when stock prices are high during booming periods (Choe et al., 1993; Graham and Harvey, 2001; Schultz, 2003; Kim and Weisbach, 2005), and that in the IPO markets, investors have reportedly enjoyed surprisingly high returns, or an underpricing phenomenon.

IPO markets have long provided opportunities firms to finance funds for growth and in most cases lower the cost capital. The surprising underpricing phenomenon in IPO markets still exists as a puzzle. Su and Fleisher (1997) report that the primary purpose for Chinese firms going public is to raise owners' capital, not mainly to transfer state ownership to private sectors, that IPO underpricing is the largest at the earliest stage of development of stock markets in China, and that absurdly huge IPO underpricing is at least partially due to a relatively small aggregate supply of shares. While the lasting and huge IPO underpricing can benefit firms to finance capital with ease from the capital market, abnormally high returns in Chinese IPO markets have caused some expected problems. Meanwhile, the opposite phenomenon has been observed in some advanced markets. As a result of a higher supply of stocks, the issuance of new stocks usually leads to decreases in IPO returns. The adverse effect of IPOs on market returns is evidenced in the U.S. (Baker and Wurgler, 2000), in emerging markets (Braun and Larrain, 2009), and internationally (Henderson et al., 2006; Wang, 2011).

Accordingly, first part of this paper focuses on the underpricing of IPOs in Chinese markets. The case is of great interest, partly due to the extreme magnitude of the initial returns and as a lasting phenomenon since the introduction of IPOs in China. There have been so many extremely high IPO initial returns, one with 29,698% offered before September 1st, 1987, another with 3,601% offered before August 8th, 1988, and another with 3,195% offered before March 20th, 1987. In addition, in contrast to Lowry and Schwert (2002) and many other studies, we will report some clear conclusions with respect to IPO puzzles: the negative relation between the IPO volume and subsequent initial returns, yet the positive relation between the initial returns and subsequent IPO volume. However, Chen et al. (2015) report hardly any evidence of such relations in the Chinese IPO markets, unlike those in the IPO market in advanced economies like the U.S., U.K., and Japan, mainly due to the intervention of the government thru the China Securities Regulatory Committee (CSRC) in market timing, volume of issuance, and policy environment. Thus, we focus on whether firms that file IPOs following high initial returns and high volume can themselves also expect to be extremely underpriced, leading to a hot period of IPOs in China, an issue still under debate. Similar to Chen et al. (2015). Second part of this paper focuses on the Post-IPO Lung-run Underperformance and test whether the initial returns (IR) or the phenomena of underpricing of IPOs is also one of the causes of Post-IPO underperformance. In addition, we study the effect of the Post-IPO initial stock return volatility and lock-up policy on the Post-IPO Underperformance in China.

Ⅱ. Related Literature

2.1. IPOs in Chinese Markets

According to Su and Fleisher (1997), the IPO markets in China have several intriguing traits. First, the government, not the market, determines through the State Planning Committee of the People's Bank of China, the Chinese central bank, and the China Securities Regulatory Committee (CSRC), the quota or aggregate amount of new shares to be issued each year, which is then distributed to individual provinces. The central security regulatory authorities ask firms to request a listing and then make a selection based on criteria, like corporate performance, regional development objectives, etc. For example, firms in public industries, like electricity and water supply, are given priority for approval. Second, a large portion of state-owned enterprises has been privatized through IPO processes by selling its ownership to other state-owned enterprises, their own employees, domestic public and foreign investors. Third, the underpricing of IPOs in the Chinese markets has shown very extreme patterns. Fourth, in practice, the CSRC generally intervenes in the IPO market by suspending IPO applications during recessions and reopening IPO applications during market booms. According to the State Council Report, the primary goals of the government in capital markets are to stabilize the markets and support more firms to finance through the markets efficiently.

According to Fang, Shi, and Xu (2012), the CSRC as a government agency usually faces a dilemma whether to facilitate more new issues or to mitigate the subsequent depression of market prices. To successfully achieve its goals, the committee is likely to use its authority to control the timing and size of IPOs. In some extreme cases, it decides to completely shut down for a long period of time and resume IPOs later. However, such peculiar interventions of the CSRC in the Chinese stock market trigger extensive debates over their efficiency. Opponents of the shutdown policy argue that decreasing the supply of stocks in IPO markets increases demand in the secondary stock market, thereby distorting the otherwise well-functioning market supply and demand system. Meanwhile, policymakers and their supporters advocate that the capital market should be evaluated in terms of its basic role to help firms raise capital. Thus, the regulatory organization balances these arguments by carefully adjusting the schedules and sequences of IPOs.

In addition, Fang, Shi, and Xu (2012) claim that the Chinese capital market is limited in capacity and open strictly to domestic investors at least for some time, although the number of potential issuers has increased over the years. The market value of the China National Petroleum Corporation (CNPC) at the time of its IPO on the Shanghai Stock Exchange in 2007 reached approximately 22% of the total market value of the exchange. Thus, due to the limitations of size and nationality, the IPO market can increase the supply of stocks and decrease the market return and heavily reduce investors' confidence, which in turn results in a decrease of investments.

Using a sample of 156 monthly returns over the period of 1996-2008, Fang, Shi, and Xu (2012) found a positive relation between the monthly issuing size and prior market returns as evidence of efficient intervention by the CSRC on the timing and issuance size based on prior market conditions. However, they found no evidence of decline in subsequent market returns after IPOs, unlike many prior studies (Ritter1991; Loughran and Ritter, 1995; and Spiess and Affleck-Graves, 1995, 1999; Lyandres et al., 2008). While IPO issuance has a significantly negative effect on the return momentum, the degree of effect is indifferent to the issuing size. They concluded that the committee's management of the timing of large IPO issuances was effective in reducing the financing costs of issuers and mitigating the negative impact on the stock market, and that for a transitional market, such as China, government intervention in the capital market at least partially improves market efficiency. While the role and efficacy of regulation in capital markets are still in dispute both in academia and practice, we test the effect of a market shut down on the IPO underpricing in China, as well as the effect of micro-factors, such as firm size and volume of the IPO issuance at the firm level, and macro-factors, such as the overall IPO market returns before the IPO of a firm.

Chen et al. (2015) recently reported that the lead-lag relationship between the initial returns and the volume of IPOs is not statistically significant due to institutional differences in the Chinese IPO markets, even though the IPO volume is sensitive to changes in market conditions (Pastor and Veronesi, 2005; Benninga et al., 2005; Yung et al., 2008), and investor sentiment (Ljungqvist et al., 2006; Bustamante, 2012), theoretically. They claim, in China, that the CSRC substantially controls IPO timing, the IPO volume does not respond to changes in market conditions or sentiment as in market-driven economies, and there is no statistically significant relationship between the IPO volume and past market returns, volatility, and valuations in China. However, they report that, similar to the U.S. IPO market, for the IPO market in Hong Kong, the IPO volume is related to past and future market returns, yet not as strongly as in the U.S., past changes in market volatility, with strong seasonality, even stronger than in the U.S., and despite a significant decline in the volume of the IPO markets in China and Hong Kong after the global financial crisis which occurred in 2008, it recovered strongly in 2009.

2.2. IPO Underpricing

Theoretically, IPO firms should be relatively overvalued since firms will try to finance by timing their equity issuance: they offer when their IPO costs are the lowest, or when the initial returns are the smallest due to the highest IPO price or low initial price on the listing date. The timing of issuing securities in the U.S. IPO market is explained generally by two theories. First, the rational market-timing theory or 'the window of opportunity', suggests that due to agency problems between managers and investors, managers have incentives to postpone their IPO when their securities are undervalued, until the bull market arrives for more favorable pricing (Lucas and McDonald, 1990; Graham and Harvey, 2001). Second, the life cycle theory suggests that a firm finds optimal timing in their life cycle to go public after its early life cycle as a private firm (Chemmanur and Fulghieri, 1999; Benninga et al., 2005). In addition to firm-level micro approaches, some prior research on IPO underpricing uses macroeconomic factors, like the stock market and bond market performances for a three-month period before the IPO (Bayless and Chaplinsky, 1991), other macroeconomic variables, including the term spread, default spread, and three-month equity market return prior to the IPO (Korajczyk and Levy, 2003), and more recently legal protection and a country's accounting disclosure standards (Wang, 2011).

However, the pattern of IPOs noticed by Ibbotson and Jaffe (1975) is puzzling because theoretically firms do not go public when the initial returns are the lowest. Rather, in reality, firms tend to go public when the initial returns are the highest. It is against the general belief that firms would prefer to raise as much capital as possible in their IPO, especially when the initial returns are at the lowest. Scholes (1972) asserts that an increase in stock supply by a new equity issuance, if it is a small percentage of the assets, should not affect market prices negatively. However, Ritter (1991) provides evidence that overoptimistic investors during certain periods contribute to especially high initial returns, as they tend to bid up the after-market price of the IPO firms. Baker and Wurgler (2000) show that an increase in asset supply by a new equity issuance leads to a decrease in future aggregate equity market returns after periods of active issuance. Lowry and Schwert (2002) report weak evidence of a negative relation between the IPO volume and future initial returns, yet a significant positive relation between the initial returns and future IPO volume. It appears that increased numbers of companies go public after observing that IPOs are being underpriced by the greatest amount. Loughran and Ritters (2002) report that the initial returns tend to be especially underpriced even though they reflect public information available during the registration period, yet only insufficiently incorporated into the offer price due to overlapping periods, generating cycles in the initial returns. Braun and Larrain (2009) also report that shocks in asset supply have a positive effect on asset prices in emerging markets. Their study also shows that a shock has a more negative effect on those stocks by the issuance of new stock in the same industry, of a similar size, or of a similar book-to-market ratio.

Lowry and Schwert (2002) reported a positive relation between the initial returns and subsequent IPO volume. However, Chen et al. (2015) reported hardly any evidence of lead-lag relations in the Chinese IPO markets, even after controlling for IPO market shutdowns due to the distinct regulatory regime in China. Thus, our study focuses on whether firms that file IPOs following high initial returns and high volume can themselves expect to also be extremely underpriced, leading to a hot period in IPOs in China, an issue still under debate.

We test the lag and lead relation between the IPO volume and average initial returns. We also investigate the effect of firm-specific factors and market factors on high initial returns as in many other prior studies. In the process, we investigate the differences and value-weighted aggregate forces in time and volume between IPOs.

2.3 Long-term Post-IPO Stock Performance

While Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) showed that new issues in the United States are followed by abnormally low stock returns for the next five years, a generally accepted explanation for these findings was in debate at that time. Though Loughran and Ritter (1995) argued that these results are explained by managers exploiting temporary share overvaluation, Spiess and Affleck-Graves (1995) and Jegadeesh (2000) found that the underperformance of new equity issues is the result of firms taking advantage of 'windows of opportunity' and selling overvalued equity to overly optimistic investors. Kang et al. (1999) showed that both convertible debt-issuing firms and equity-issuing firms underperform for at least five years in Japan and the performance of firms issuing equity privately is not different from that of other firms issuing equity publicly. Lyandres et al. (2008) showed that real investment is an important driving force behind the 'new issue puzzle'. While their evidence provides theoretical support to the predictions of Zhang (2005a) and Carlson, Fisher, and Giammarino (2006), it does not rule out mispricing arguments. Balia et al. (2013) found evidence for a significantly negative relation between net share issues and expected returns in the United Kingdom and Japan. However, the results from Germany, France, Italy and Canada indicate that the relation between net share issues and expected returns is positive.

The findings on the Chinese stock market are mixed. Chen et al. (2000) found that Chinese IPOs listed from 1992 to 1995 underperformed on the market after 3 years of listing. Similarly, Gu (2003) found that the 68 IPOs that went public in 1994 underperformed on the market by 53% and 57% after 3 and 5 years of listing, respectively. Niu, Song and Guo (2013) found that investors achieve negative abnormal returns, and that IPO firms underperform on the market over one- and three-year periods. In contrast, other researchers found the opposite. Mok and Hui (1998) found that underpriced IPOs underperform on the market as a whole during the first 75 trading days, yet outperform on the market with a few percent above zero during the rest of the 350 holding days, plus overpriced IPOs also underperform on the market during the first 20 trading days, yet enjoy high excess returns during the rest of the 350 holding days. Bai and Zhang (2004) using IPO firms issued on the Shenzhen and Shanghai Stock Exchange between January 1998 and December 2000 found that the long-run stock performance of IPO firms is better than that of non-IPO firms. For our data set for the last 12 years, we set up the following hypothesis to test the 'new issue effect' on the Chinese capital market.

Ⅲ. Hypotheses and Test Models

3.1. Hypotheses

3.1.1 Effects of Market Information on Initial Returns

Basically, a higher IPO price leads to a larger IPO volume, given that the issuance number is fixed. Therefore, the initial returns will be smaller, even with the same first trading day price, leading to a negative relation between them. Hanley (1993) showed a negative relation between initial returns and the proceeds of IPOs. Meanwhile, Braun and Larrain (2009) showed that a supply shock by another firm in the same industry, of a similar size or with a similar book-to-market ratio, has a more negative effect on initial returns. Thus, the larger the size of an IPO, the lower the initial returns of the IPO. We then hypothesize as follows.

Hypothesis 1: The magnitude of an IPO has a negative effect on the initial return of the IPO.

Lowry and Schwert (2002) showed a positive effect of IPO market returns on initial returns, without a strong statistical significance, whereas Loughran and Ritter (2002) showed that initial returns are significantly related to IPO market returns during the 30 days prior to the offering, with a strong statistical significance. Following Loughran and Ritter (2002), we set the following hypothesis.

Hypothesis 2: The returns of IPOs offered prior to an IPO have a positive effect on the initial return of the subsequent IPO.

To test the effect of spillover information in our study, we introduce the number of IPOs, as in Lowry and Schwert (2002). They showed a strong negative relation between current initial returns and past numbers of IPOs. Ritter (1991) provided evidence of investors' over-reaction during certain periods leading to underpricing in a subsequent IPO. However, following Lowry and Schwert (2002), we set the following hypotheses for the number of IPOs in the current period and in the previous period as follows.

Hypothesis 3: The number of IPOs in the current period has a negative effect on the initial return of a subsequent IPO.

Hypothesis 3-1: The number of IPOs in the previous period has a negative effect on the initial return of a subsequent IPO.

In addition, we introduce time lags among IPOs, represented by the aggregate proximity in time, measured in months for 30 IPOs prior to the IPO. Thus, we set the following hypothesis to study the effect of distance in time as follows.

Hypothesis 4: The aggregate distance in time with prior IPOs has a negative effect on the initial return of a subsequent IPO.

3.1.2 Initial Returns and causes of Long-term Post-IPO Stock Performance

There is a generally accepted explanation for post-IPO underperformance: according to the empirical research by Ritter (1991), Santos (2010), Sohn et al. (2012), and Niu, Song and Guo (2013), firms with the greatest underperformance are those with high initial returns at the time of issuance. Levis (1993) and Paudyal et al. (1998) argued that initial excess returns might be due to initial over-optimism in the market. Accordingly, such issues should create underperformance on the market in the long run. In contrast, if firms are fairly valued at the time of the initial issue, their long-run performance should not be significantly different from that of the market. Following these previous studies, we set up the following hypothesis in order to use the initial returns to explain the underperformance of new issues during a normal period.

Hypothesis 5: Firms with higher initial returns at the time of issuance experience more serious underperformance after offering.

Hypothesis 6: Firms with higher stock return volatility after the time of issuance experience more serious underperformance in long-run.

Hypothesis 7: the lock-up policy partial eases the Post-IPO Underperformance but the stock return volatility after open-up the locked trading stock can exacerbate the Post-IPO Underperformance.

3.2. Empirical Models

First part of our study is focused on two issues still under debate; whether firms that file IPOs following high initial returns and a high volume can themselves also expect to be extremely underpriced, and whether underpricing in the previous period leads to a hot period subsequently in IPO markets in China. Basically, we develop the model from Lowry and Schwert (2002) for the empirical study to reflect the market information.

To test whether firms that file IPOs following high initial returns and a high volume can themselves also expect to be extremely underpriced, leading to a hot period in IPOs in China, we developed the empirical models below. We use the initial returns (IR) defined as the difference between the first-day market opening price minus the IPO price, divided by the IPO price, as shown in (1).

$$\mathrm{IR}_{it} = \frac{\text{Open Price}_{it} - \text{IPO Price}_{it-1}}{\text{IPO Price}_{it-1}} \tag{1}$$

Here, we assume that using the first-day market closing price, as by Lowry and Schwert (2002), to calculate the initial returns can cause a significant distortion for the following reasons. First, based on the beliefs of investors, known as prospect theory, IPO investors, after realizing huge initial margins, do not hold onto IPO stocks, but rather sell at least some of them to avoid downside risks in price. Second, according to market segmentation theory, there can be a separate market for IPO investors and post-IPO investors. Thus, we use the open price on the listing date as the selling price in the market for IPO underpricing and as the purchasing price in the following study with respect to IPO firms' overvaluation after underpricing.

Unlike most previous studies, we do not use monthly returns or periodic average returns in order to reflect firm-specific traits in IPOs and reflect the information effects of volumes, IPO returns, passing periods in time and other market and firm factors for a different time span. While other studies use calendar years, we use the duration of the time-span and value-weighted IPO returns and time-span of the prior 30 IPOs defined. To simultaneously control the magnitude and dispersion of IPO bubbles in the market, we similarly introduce the time-span and value-weighted IPO market returns of 30 prior IPOs.

In this study, we use distance in time or more precisely distance in 'information spillovers', as discussed in Lowry and Schwert (2002). We calculate the time lags in months for each of 30 IPOs prior to the IPO date. This use of time differences among IPOs was uniquely developed for this study. To reflect the overall market performances of IPOs before an IPO, we also introduce both a value weighted and equally weighted return R_m to 30 IPOs prior to the offer date, which is similar to Lowry and Schwert (2002), who used the CRSP equal-weighted portfolio of stocks for the 30 trading days prior to the offer date[12]. In addition, to test the effect of spillover information, we introduce the number of IPOs, defined as NIPO, in the same or past month. Information spillovers have been reported to produce a negative relation between the IPO volume and subsequent initial returns, yet a strong positive autocorrelation.

Furthermore, following Lowry and Schwert (2002), we introduce the volume of IPOs, M_it. We also introduce various dummy variables to control firm-specific factors as follow.

$$\begin{aligned} IR_{it} = \propto & \\ & +\beta_1 \ln M_{it} + \beta_2 \ln \textstyle\sum_{j=1}^{n} M_{ijt-1} + \beta_3 \ln \sum_{j=1}^{n} D_{ijt-1} + \beta_4 R_{imt-1} + \beta_5 \mathrm{NIPO}_{it} + \beta_6 \mathrm{NIPO}_{it-1} + \\ & \beta_7\, \mathrm{Shenzhen}_{\mathrm{D}\,it} + \beta_8 \ln \mathrm{Asset}_{it-1} + \, e_{it} \end{aligned} \tag{2}$$

where M_{ijt-1} is the sum of proceeds for other IPO firms, D_{ijt-1} is the sum of time in months passed for other IPO firms, R_{imt-1} or $\sum_{j=1}^{n} W_j R_{jt-1}$ is the IPO market returns calculated as value-weighted initial returns, $\mathrm{Shenzhen\_D}_{it}$ is the dummy variable for a stock, 1 if an IPO was on the Shenzhen Stock Exchange and 0 otherwise and the size of the firm in

[1] Although Ibbotson, Sindelar, and Ritter (1994) and Lowry and Schwert (2002) use the average, across all IPOs each month, of the percentage diff erence between the closing price within the first month after the IPO and the offer price, we do not use a monthly average.

[2] Equally weighted IPOs of small firms can have the same influence as IPOs of large firms. In contrast, value weighted IPOs of larger firms have a larger influence than those of smaller firms. We apply both weighting methods in this study.

total assets at the end of the previous year. We use 30 IPO firms prior to the specific IPO firm i in time t. We simply assume that IPO firms refer to information in the market prior to their own IPO.

Now, we simplify the notations in (2) to use basic regression models, the ordinary least squares (OLS) multiple regression models in Lowry and Schwert (2002), as follows for the whole period:

$$IR_{it} = \propto + \beta_1 M_{it} + \beta_2 \mathrm{Rm30}_{it-1} + \beta_3 \mathrm{NIPO}_{it} + \beta_4 \mathrm{NIPO\_L}_{it-1} + \beta_5 \mathrm{Asset}_{it-1} + e_{it} \quad (3)$$

$$IR_{it} = \propto + \beta_1 M_{it} + \beta_2 \mathrm{Rm30}_{it-1} + \beta_3 \mathrm{NIPO}_{it} + \beta_4 \mathrm{NIPO\_L}_{it-1} + \beta_5 \mathrm{Shenzhen}_{it} + \beta_6 \mathrm{Asset}_{it-1} + e_{it} \quad (3\text{-}1)$$

Furthermore, we introduce the other market information factors, aggregate magnitude M_30_{it-1}, and aggregate distance $Dist\_30_{it-1}$ into the basic models. Regression models with Rm_30Ew, equally weighted using 30 IPO firms prior to the specific IPO and Rm_30Vw, value weighted using 30 IPO firms prior to the specific IPO for the whole period. We also test whether there are differences between periods, before 2004 and after 2004 inclusive, by introducing a period dummy for the recent period (Recent_D) instead of a dummy for the exchanges (Shenzhen). Recent_D is the dummy variable for the year of the IPO, 1 if an IPO was offered after 2004 inclusive and 0 otherwise. For simplicity, we use the following regression models.

$$IR_{it} = \propto + \beta_1 M_{it} + \beta_2 \mathrm{M\_30}_{it-1} + \beta_3 Dist\_30_{it-1} + \beta_4 Rm\_30Ew_{it-1} + \beta_5 \mathrm{NIPO}_{it} + \beta_6 \mathrm{NIPO\_L}_{it-1} + \beta_7 \mathrm{Recent\_D}_{it} + \beta_8 \mathrm{Asset}_{it-1} + e_{it} \quad (4\text{-}1)$$

$$IR_{it} = \propto + \beta_1 M_{it} + \beta_2 \mathrm{M\_30}_{it-1} + \beta_3 Dist\_30_{it-1} + \beta_4 Rm\_30Vw_{it-1} + \beta_5 \mathrm{NIPO}_{it} + \beta_6 \mathrm{NIPO\_L}_{it-1} + \beta_7 \mathrm{Recent\_D}_{it} + \beta_8 \mathrm{Asset}_{it-1} + e_{it} \quad (4\text{-}2)$$

To test whether firms' lung-run Post-IPO Underperformance following high initial returns, we use Buy-and-Hold returns (BHR) and Cumulative returns (CR) to measure the long-run market performance of IPO and calculated as follows:

$$BHR_{i,T} = \prod_{t=1}^{T}(1 + r_{i,t}) \quad (5)$$

$$CR_{i,T} = \sum_{t=1}^{T} r_{i,t} \quad (6)$$

where $r_{i,t}$ is the daily stock returns on firm i for the trading day t. In this study we use five-year Buy-and-hold returns (BHR) and Cumulative returns (CR), so that T=5.

In order to test hypothesis 5: firms with higher initial returns at the time of issuance experience more serious underperformance after offering, we use the initial returns (IR) to explain the long-term underperformance and add a high-return dummy variable to the model. In addition, we study the effect of the Post-IPO initial stock return volatility on Post-IPO Underperformance and the regression model as follows:

$$R_i = \propto + \beta_1 High\_D_i + \beta_2 IR_{it} + \beta_3 STD\_1M_i + \sum_{k=4}^{9} \beta_k r\_m_i(k) + \beta_{10} STD\_5Y_i + \beta_{11} MKTr\_5Y_i + \beta_{12} MKTstd\_5Y_i + \varepsilon_{it} \quad (7)$$

Where, R_i is the five-year post-issue buy-and-hold return or five-year cumulative return on firm i, $High\_D_i$ is the high-return dummy variable for a stock, 1 if five-year post-issue buy-and-hold return or cumulative return is higher than matching market buy-and-hold return or cumulative return and 0 otherwise, STD_1M_i is the standard deviation of stock returns on firm i during the first month after IPO, $r\_m_i(k)$ is the k-month buy-and-hold return or cumulative return on firm i during the first six month after IPO, STD_5Y_i is the standard deviation of stock returns on firm i during the first five-years after IPO, $MKTr\_5Y_i$ is the matching market five-year buy-and-hold return or cumulative return on firm i, $MKTstd\_5Y_i$ is the standard deviation of matching market returns on firm i during the five years after the IPO of firm i.

In order to test the effect of lock-up policy on Post-IPO Underperformance in China and the regression model as follows:

$$R_i = \propto + \beta_1 Lock\_D_i + \beta_2 IR_{it} + \beta_3 STD\_1M_i + \beta_4 STD\_OPENM_i + \sum_{k=5}^{10} \beta_k r\_m_i(k) + \beta_{11} STD\_5Y_i + \beta_{12} MKTr\_5Y_i + \beta_{13} MKTstd\_5Y_i + \varepsilon_{it} \quad (8)$$

Where, $Lock\_D_i$ is the locked-up dummy variable for firm i, 1 if introduced the lock-up policy and 0 otherwise, STD_OPENM_i is the standard deviation of stock returns of firm i during the first month after open-up the locked trading stock.

Ⅳ. Data and Descriptive Statistics

4.1. Underpricing in China

The data used in this study is a merged dataset obtained from two sources, the RESSET database from RESSET Technology Co., Ltd., a Chinese firm specializing in financial databases, and the GTA database from GTA Information Technology Co., Ltd., a nationwide high-tech company providing solutions to the education and investment sectors in China. The statistical traits of the data used in this study are described below. Later sections of our study utilize firm-level initial returns, and this data will be described at that point.

Table 1 shows that the numbers of firms going public in China exhibit a very clear cyclical pattern, with a big boom in 1991 and 1992, followed by much fewer IPOs in 1993, 1994, and 1995, another big boom in IPOs from 1996, with 189 IPOs in 1997, 102 in 1998, 91 in 1999, and 134 in 2000, followed by 64 in 2001, 70 in 2002, and 66 in 2003. Again, the number reaches 98 in 2004 and drops to only 15 in 2005.

The number of IPOs peaks at 347 in 2010, followed by 277 in 2011 and then 150 in 2012. However, it is only 2 in 2013, increases to 125 in 2014, and then 213 in 2015. This pattern is repeated many times over the 31-year period, which is quite similar to the situation in the U.S, markets, as reported by Lowry and Schwert (2002). The cyclical patterns are similar for the numbers of IPOs in both the Shanghai and Shenzhen exchanges.

In contrast, the average yearly initial returns are high in the 1980s and early 1990s, decrease from the late 1990s, and then become more or less steady, at least relatively. For example, they increase from 650.0% in 1984, 385.5% in 1985, 1,022.8% in 1986, to 6,351.7% in 1987, then decline to 1,308.9% in 1988 and 652.5% in 1989. Such extremely high average yearly returns stay well over 100% until 2002, except for 91.4% in 1995. They then decline to 68.0% in 2003, 68.5% in 2004, 45.5% in 2005, and 77.9% in 2006. The average increases back over 100% to 190.0% in 2007 and 100.0% in 2008, then declines to 61.4% in 2009 and 38.7% in 2010. They reach 19.4% at the lowest in 2011 and bounce back to 25.3% in 2012, and 36.9% in 2013. These cyclical patterns are similarly repeated over the years for both exchanges, although without the extreme returns seen in the 1980s and early 1990s. Cyclical patterns are also observed in the U.S. markets, as reported by Lowry and Schwert (2002), yet there are some distinct differences. First, when compared with the U.S. markets, the relation between the number of IPOs and initial returns is not so clear in the Chinese markets. Second, the lags and leads also are not so clear in the Chinese markets. Third, the cyclical patterns show larger variations in the Chinese markets than in the U.S. markets.

Table 1. Number of IPOs and Initial Returns by Exchange

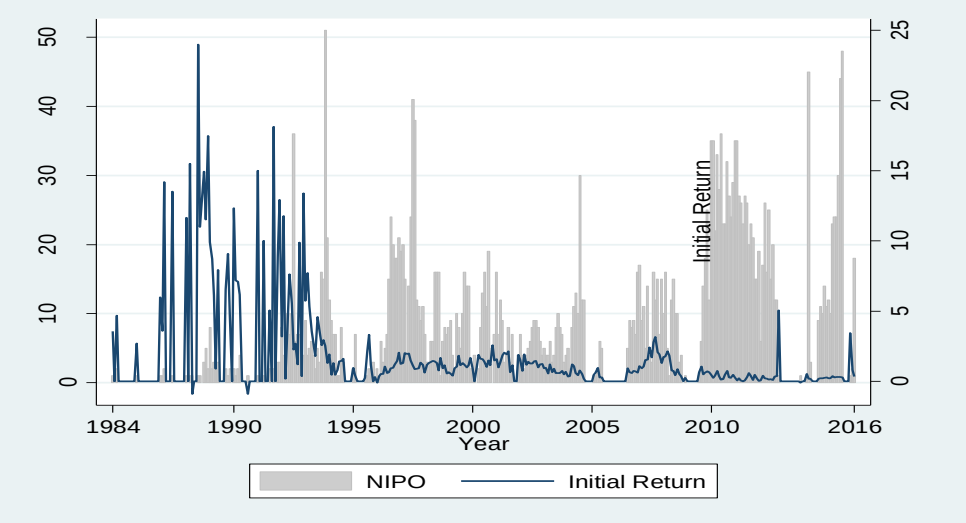
Year	Full Sample		Shanghai Exchange		Shenzhen Exchange	
	Firms	Initial Returns	Firms	Initial Returns	Firms	Initial Returns
1991	17	7.538	4	12.249	13	6.089
1992	110	4.390	78	2.951	32	7.899
1993	144	2.630	76	2.789	68	2.452
1994	40	1.018	22	1.117	18	0.898
1995	17	0.914	8	1.392	9	0.489
1996	176	1.093	86	0.970	90	1.210
1997	189	1.385	83	1.380	106	1.388
1998	102	1.196	52	1.258	50	1.132
1999	91	1.128	45	1.105	46	1.151
2000	134	1.505	94	1.546	40	1.409
2001	64	1.398	64	1.398	0	

2002	70	1.253	69	1.267	1	0.291
2003	66	0.680	66	0.680	0	
2004	98	0.685	59	0.699	39	0.662
2005	15	0.455	2	0.579	13	0.436
2006	71	0.779	15	0.367	56	0.889
2007	121	1.900	24	1.212	97	2.070
2008	77	1.000	6	0.384	71	1.051
2009	111	0.614	10	0.413	101	0.634
2010	347	0.387	28	0.364	319	0.389
2011	277	0.194	38	0.157	239	0.200
2012	150	0.253	26	0.322	124	0.238
2013	2	0.369	1	0.537	1	0.200
2014	125	0.221	44	0.238	81	0.212
2015	213	0.326	86	0.353	127	0.308
Total	2,889	1.341	1,117	1.803	1,772	1.050

Figure 1 shows the monthly IPO volume and initial returns between 1984 and 2015 for firms going public on both the Shanghai and Shenzhen Stock Exchange. The initial returns reach over 2,000% in many cases in the early 1990s with many ups and downs, there are also many periods with monthly average initial returns higher than 100%, plus hot periods and cool periods, and even some periods without any IPOs for some months after hot periods with enormous initial returns. Before 1995, periods of high and rising IPO returns tend to be followed by a big increase in the number of IPOs, followed by periods of seemingly lower initial returns afterwards.

For example, the high initial returns of the 1980s and early 1990s are followed by large numbers of firms going public in late 1991 and 1992, and then by much fewer IPOs in 1993, 1994, and 1995, followed by another big boom in IPOs from 1996 with 189 IPOs in 1997, 102 in 1998, 91 in 1999, and 134 in 2000, followed by 64 in 2001, 70 in 2002, and 66 in 2003. Again, the number reaches 98 in 2004 and drops to only 15 in 2005. This pattern is repeated many times over the 31-year period, and is quite similar to the situation in the U.S. markets, as reported in Lowry and Schwert, 2002. There are also some shutdown periods without any IPOs, possibly following very hot IPO markets or followed by hot IPO markets. The cyclical patterns observed are not market driven, as in the U.S. market, but rather CSRC driven. It seems that even with government intervention in the timing of IPOs, there are huge cycles repeating over time as regards the number of IPOs and magnitude of the initial returns.

Figure 1. Average Initial Returns from IPOs and Number of IPOs (NIPOs) per Month



4.2. Data descriptive statistics for the market information effect on the underpricing of IPOs

Table 2 presents the mean, median, standard deviation, minimum, and maximum of the various variables used in this study. In contrast to Table 1, the total number of IPOs used in this table is 2,153. Thus, 736 IPOs are excluded from the full sample due to outlier problems and lack of useful information, mostly in total assets. Notwithstanding the exclusion of exorbitant outliers, some extreme values are still included[3].

Table 2: Descriptive Statistics

Var.	Obs.	Average	Stand. Dev	Min Value	Max Value	Median Value
IR	2,153	0.937	1.090	-1.000	9.080	0.635
M	2,153	10.584	1.053	5.858	15.715	10.560
M_30	2,153	2.846	2.978	0.148	25.232	1.995
Rm_30Vw	2,153	1.070	1.156	-0.058	8.996	0.877
Rm_30Ew	2,153	1.086	1.171	-0.003	11.613	0.869
Dist_30	2,153	15.9	7.495	0.04	1,069.7	5.3
NIPO	2,153	19.550	10.896	1.000	51.000	17.000
NIPO_L	2,153	17.216	10.692	0.000	51.000	16.000
Asset	2,153	20.138	1.340	16.025	29.815	19.895

Here, we focus on certain variables of interest, such as the initial returns (IR) and volume (M) of the IPO measured using a natural logarithm, IPO market return (Rm_30Ew) equally-weighted average of, aggregate volume (M_30) in 100 million yuan of proceeds and distance (Dist_30) from 30 other IPOs in months, prior to a specific IPO measured, and the number of IPOs (NIPO). The initial return (IR) is 93.7% on average for the selected sample of 2,153 IPOs, the median 63.5%, the minimum -100.0%, and the maximum 908.0%. The volume of IPOs measured using a natural logarithm of million yuan (M) is about 10.58, the median 10.56, the minimum 5.86, and the maximum 10.72. Aggregate volume, measured by the amount of proceeds of 30 other IPOs in months (M_30) is about 141.7 million yuan, the median 89.1 million yuan, the minimum 7.0 million yuan, and the maximum 2,205.5 million yuan. The average distance (Dist_30) from 30 other IPOs measured in months prior to a specific IPO, is about 65.0, the median 7.6, the minimum 0.0, and the maximum 502.0, which implies some extremes. Most importantly, the number of IPOs (NIPO) is about 19.6 on average, the median 17, the minimum 1 for itself, and the maximum 51. The equally-weighted average initial return (Rm_30Ew) of 15 other IPOs is about 107.0% on average, the median 87.7%, the minimum -5.8%, and the maximum 899.6%. All other explanations are skipped for simplicity.

Table 3 presents the Pearson correlations between the variables used in this study. Basically, we focus on the correlation between a dependent variable and other major independent variables of concern. The correlation between the initial returns (IR), the dependent variable, and the volume of the IPO (M), or the amount of proceeds from the IPO is -43.6%, negative at a significance level of 1%. The correlation between the dependent variable and the aggregate volume of 30 other IPOs (M_30) is -4.3%, also negative at a significance level of 5%. The correlation between the dependent variable and the IPO market return (Rm_30Ew) equally-weighted average of 30 other IPOs is 50.8%, positive at a significance level of 1%. The correlation with distance (Dist_30) in time from 30 other IPOs in months is -2.6%, yet not statistically significant at a level of 10%, while the aggregate volume of 30 other IPOs (M_30), is -2.9%, also not statistically significant at a level of 10%. The correlation between the initial returns (IR) and the number of IPOs for the current month (NIPO) and previous month (NIPO_L) is -23.6% and -5.8%, respectively, both negative at a significance level of 1%. The correlation between the initial return and the size of an IPO firm measured by (Asset) is -5.8%, negative at a significance level of 1%. Thus, other than the IPO market return (Rm_30Ew), the independent variables show some negative relations with the initial returns on IPO investments, although some are not statistically significant for distance (Dist_30). Notwithstanding, the significantly negative or positive correlation among other variables affects our conclusion with paired correlations with the initial returns (IR), since a multi-lateral correlation can cause multi-collinearity in the formal regression analyses.

[3] Such extremes are included since they basically do not distort the results of the main statistical relations in regressions and other statistical tests.

Table 3. Pearson Correlation Coefficient between Variables

Variables	IR	M	M_30	Rm_30Ew	Rm_30Vw	Dist_30	NIPO	NIPO_L
M	-0.436 ***	1						
M_30	-0.043 **	0.206 ***	1					
Rm_30Ew	0.508 ***	-0.395 ***	-0.121 ***	1				
Rm_30Vw	-0.026	0.031 *	-0.005	-0.026	1			
Dist_30	-0.029	0.050 *	0.125 ***	-0.049 ***	-0.011	1		
NIPO	-0.209 ***	0.120 ***	-0.011	-0.236 ***	0.006	-0.099 ***	1	
NIPO_L	-0.236 ***	0.192 ***	-0.019	-0.332 ***	0.030	-0.192 ***	0.567 ***	1
Asset_	-0.058 ***	0.032	-0.029	-0.106 ***	-0.049 **	-0.047 **	0.054 **	0.046 **

Note. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

Table 4 presents the results of group mean tests for differences between the means of two groups, Shanghai and Shenzen Exchange listed firms, for each variable used in this study. Each statistic shows the average value for each variable, difference in the group means between the two stock markets, and its statistical significance. The mean tests are performed assuming the variances of the two groups are not equal. Obviously, the two markets show significantly different traits judging based on certain critical financial ratios.

Table 4. Group Mean Tests for Firms on Shanghai and Shenzen Exchanges

Var.	Shanghai (A)	Shenzen (B)	Difference (A-B)		t-stat
IR	1.061	0.790	0.271	***	6.370
M	145,677	58,380	87,296	***	6.406
M_30	2,006,825	3,263,984	-1,257,159	***	-10.823
Dist_30	602.155	8.007	594.148	***	7.049
Rm_30Ew	.329	0.909	0.420	***	8.379
Rm_30Vw	1.395	0.933	0.462	***	8.016
NIPO	17.125	22.247	-5.122	***	-11.106
Asset	28,900	9,230	19,670		1.591

Note 1. *** and * denote statistical significance at 1% and 10% level, respectively.

2. Tests are performed assuming the variances of the two groups are unequal.

The initial returns (IR) from IPOs are higher by 27.1%p on average at a significance level of 1% for the Shanghai Exchange listed firms when compared with the Shenzen Exchange listed firms. The volume of the IPO (M), or amount of proceeds from the IPO is also much larger on average at a significance level of 1% for the Shanghai Exchange listed firms, relatively. However, the aggregate volume of 30 other IPOs (M_30) is much larger on average for the Shenzen Exchange listed firms relatively at a significance level of 1%. The equally-weighted IPO market return of 30 (Rm_30Ew) and value-weighted IPO market return of 30 other IPOs (Rm_30Vw) is higher by 42.0% and 46.2%, respectively, at a significance level of 1% for the Shanghai Exchange listed firms when compared with the Shenzen Exchange listed firms, although the number of IPOs in the same month (NIPO) as the IPO are more for about 5 firms on average on the Shenzen Exchange in contrast to the Shanghai Exchange at a significance level of 1%. The size of the IPO firms listed on the Shanghai Exchange, measured by (Asset), is on average about 3 times larger than the size of the IPO firms listed on the Shenzen Exchange, insignificant even at a level of 10%.

4.3. Post-IPO Underperformance in China

In Table 5 and Figure 2, we present the annual returns on issuers and their matching benchmarks during the five years after the offerings. We divide the first year into two six-month periods and present the annual returns on issuers from the Shanghai Stock Exchange and Shenzhen Stock Exchange. We also present the annual returns on listed Chinese state-owned enterprises (SOEs).

Figure 2. Average Annual Raw Returns for IPOs and their Matched Firms

For all new issuers on the Chinese stock market between 1991 and 2011, the returns are lower during each of the five years after issuing when compared with their matching benchmarks. Loughran and Ritter (1995) showed that, for new issuers on the United States capital market, there is no underperformance during the six months after the offering. Conversely, according to our results, there is serious underperformance during the first six-month holding period and this situation continues until the second year on the Chinese stock market.

Loughran and Ritter (1995) also showed a severe underperformance during the second, third, and fourth year, yet the underperformance narrows noticeably by the fifth year. However, according to our results, the severe underperformance only exists during the first and second year on the Chinese stock market. Almost the same phenomenon exists on both the Shanghai Stock Exchange and the Shenzhen Stock Exchange.

However, there is no underperformance during the third, fourth, and fifth year after the offering on the Shanghai Stock Exchange, yet the underperformance widens noticeably by the fifth year on the Shenzhen Stock Exchange. For the listed Chinese state-owned enterprises (SOEs), the returns are lower during the first and second year, yet there is no underperformance during the third, fourth, and fifth year. In Table 5, we also report the t-statistics for the null hypothesis that the difference in annual returns between the issuing firms and their matching benchmarks is zero. The null hypothesis can only be rejected at high levels of statistical significance for IPOs during their first and second year after the offering. In summary, according to our results, the 'new issue effect' only exists during the first and second year on the Chinese stock market, and does not last for the third or fifth year.

Table 5: Average Annual Returns during Five Years after Issuing for Firms Conducting Initial Public Offerings (IPOs) during 1991-2011, and their Matching Benchmarks

	First 6 Months	Second 6 Months	First Year	Second Year	Third Year	Fourth Year	Fifth Year
Panel A. IPO Firms							
IPO firms (%)	-12.12	-11.77	-24.07	-11.42	33.41	17.61	17.69
Benchmark (%)	1.92	-0.10	3.00	3.45	35.50	22.99	29.19

t-Statistic for difference	-15.08	-12.85	-20.48	-12.72	-1.18	-2.63	-4.91
Panel B. IPO Firms Listed on Shanghai Stock Exchange							
IPO firms (%)	-15.29	-9.38	-20.33	-2.01	68.27	23.54	5.99
Benchmark (%)	-2.42	-5.55	-4.51	7.45	68.37	17.07	-2.87
t-Statistic for difference	-6.91	-1.33	-4.84	-3.52	-0.02	1.27	1.25
Panel C. IPO Firms Listed on Shenzhen Stock Exchange							
IPO firms (%)	-11.64	-12.12	-24.62	-12.77	28.16	16.65	19.72
Benchmark (%)	2.59	0.69	4.10	2.88	30.55	23.95	34.75
t-Statistic for difference	-13.74	-13.54	-20.07	-12.24	-1.28	-3.28	-6.19
Panel D. Listed SOEs							
IPO firms (%)	-13.28	-9.61	-20.12	-0.72	48.72	10.52	10.30
Benchmark (%)	2.83	-0.43	6.23	12.77	48.27	13.93	11.99
t-Statistic for difference	-9.65	-5.51	-9.62	-5.73	0.12	-1.11	-0.44

4.4. Data descriptive statistics for the causes of the Post-IPO Underperformance

Table 6 presents the mean, median, standard deviation, minimum, and maximum of the various variables used in this part. In contrast to part 1, the total number of IPOs used in this table is 2,765. First, the dependent variance, r measured by the monthly return of individual stock, is on average approximately 1.82% in China from 2004 to 2015. The means of the monthly return is higher than its median, implying that the monthly return is skewed to the left.

Table 6: Descriptive Statistics

Var.	Obs.	Average	Stand. Dev	MinValue	MaxValue	MedianValue
CR5Y	2765	1.034701	0.879303	-1.97285	3.676437	1.085948
BH5Y	2765	2.135928	1.911472	0.091919	17.81342	1.613122
High_D_cr	2765	0.76094	0.426586	0	1	1
High_D_bh	2765	0.568535	0.49537	0	1	1
IR	2765	0.929774	1.015177	-0.869	7.7	0.597849
STD_1M	2765	0.037079	0.016877	4.31E-05	0.144835	0.035084
CR_m(1)	2765	0.093238	0.419381	-0.59936	2.101114	-0.01013
CR_m(2)	2765	-0.00519	0.180165	-0.81756	0.880219	-0.01228
BH_m(1)	2765	1.208328	0.90714	0.52757	7.407748	0.980103
BH_m(2)	2765	0.997241	0.186767	0.405055	2.294929	0.979594
STD_5Y	2765	0.034007	0.009857	0.015446	0.113863	0.032336
MKTcr_5Y	2765	0.480319	0.525688	-0.78076	3.042243	0.480649
MKTbh_5Y	2765	1.480712	0.793893	0.370029	10.73474	1.328241
MKTstd_5Y	2765	0.019321	0.005047	0.011689	0.046449	0.018071

Table 7. Pearson Correlation Coefficient between Variables

Variables	CR5Y	STD_1M	STD_5Y	IR	CR_m(1)	CR_m(2)	CR_m(3)	CR_m(4)	CR_m(5)	CR_m(6)	MKTcr_5Y	MKTstd_5Y	BH5Y	BH_m(1)	BH_m(2)	BH_m(3)	BH_m(4)	BH_m(5)	BH_m(6)
STD_1M	0.1654***	1																	
STD_5Y	0.4712***	0.4577***	1																
IR	-0.2378***	0.0488**	-0.1404***	1															
CR_m(1)	0.1861***	0.2791***	0.64***	-0.1848***	1														
CR_m(2)	0.0248	0.048**	-0.0658***	-0.0538***	-0.1191***	1													
CR_m(3)	0.0653***	0.0105	0.0044	-0.0341*	0.0164	-0.0804***	1												
CR_m(4)	0.068***	0.1032***	0.0246	-0.0155	-0.0064	-0.0036	-0.083***	1											
CR_m(5)	0.0705***	0.1004***	0.1011***	-0.0063	0.1456***	-0.0463**	-0.0976***	-0.027	1										
CR_m(6)	0.0664***	0.0264	0.0716***	-0.0174	0.0979***	-0.0209	-0.0752***	-0.0787***	-0.0748***	1									
MKTcr_5Y	0.5225***	-0.0099	-0.0135	-0.0494***	-0.2757***	0.01	0.0902***	0.0522***	-0.0102	0.0137	1								
MKTstd_5Y	0.3626***	0.4512***	0.7335***	0.0487**	0.391***	-0.0529***	0.0049	0.0381**	0.0556***	0.0837***	0.2069***	1							
BH5Y	0.8088***	0.0583***	0.2909***	-0.1873***	0.2204***	0.0551***	0.0855***	0.0756***	0.0669***	0.0604***	0.3178***	0.1629***	1						
BH_m(1)	0.1805***	0.1141***	0.6193***	-0.143***	0.9325***	-0.1802***	0.0098	-0.0504***	0.128***	0.1417***	-0.2676***	0.3744***	0.2215***	1					
BH_m(2)	0.0285	0.0535***	-0.0417**	-0.0535***	-0.0921***	0.986***	-0.065***	-0.0135	-0.0451**	-0.0182***	0.0064	-0.0303	0.0555***	-0.1482***	1				
BH_m(3)	0.0631***	0.0194	0.0088	-0.0344*	0.008	-0.059***	0.9876***	-0.0758***	-0.0928***	-0.0827***	0.0884***	0.0098	0.08***	-0.0049	-0.0456**	1			
BH_m(4)	0.0745***	0.1063***	0.0466**	-0.0178	0.0166	-0.0184	-0.0656***	0.9883***	-0.028	-0.0665	0.0465**	0.0544***	0.0825***	-0.0249	-0.0274	-0.0589***	1		
BH_m(5)	0.0795***	0.1022***	0.1129***	-0.0078	0.1519***	-0.0484**	-0.1004***	-0.008	0.9883***	-0.0644***	-0.0062	0.0697***	0.0775***	0.135***	-0.0479**	-0.0962***	-0.0051	1	
BH_m(6)	0.0686***	0.0281	0.0758***	-0.0213	0.1004***	-0.0283	-0.0756***	-0.0834***	-0.0606***	0.9896***	0.0152	0.0862***	0.0609***	0.1438***	-0.0261	-0.0825***	-0.0717***	-0.0518***	1
MKTbh_5Y	0.4559***	-0.0423**	-0.0342*	-0.0602***	-0.1826***	0.0214	0.1107***	0.0661***	0.0172	0.001	0.9054***	0.0704***	0.3649***	-0.1839***	0.0183	0.1053***	0.0607***	0.0204	0.0037

Note) ***, **, * denote statistical significance at the 1%, 5% and 10% levels, respectively, using a two-tailed test.

The independent variables, five-year post-issue cumulative return (CR5Y) and buy-and-hold return (BH5Y) are on average approximately 103.4% and 213.6%, respectively. The independent variables, high-return dummy High_D_cr and High_D_bh are on average 0.76 and 0.57, respectively. The means of initial return (IR) is 92.97%. The standard deviation of stock return on firm i during the first month (STD_1M) is on average 0.037. The means of first-month, second-month, third-month, fourth-month, fifth-month and sixth-month cumulative return CR_M(1), CR_M(2), CR_M(3), CR_M(4), CR_M(5),CR_M(6) are 0.09, -0.005,0.0018,0.016,0.023and 0.012, respectively. The means of first-month, second-month, third- month, fourth-month, fifth-month and sixth-month buy-and-hold return BH_M(1), BH_M(2), BH_M(3), BH_M(4), BH_M(5), BH_M(6) are 1.2, 0.997, 1.003, 1.019, 1.024 and 1.14, respectively. The standard deviation of stock returns on firm i during the first five-years after IPO (STD_5Y) is on average approximately 0.034. The means of matching market five-year buy-and-hold return (MKTbh_5Y) and cumulative return (MKTcr_5Y) are 148% and 48%, respectively. The standard deviation of matching market returns (MKTstd_5Y) is on average approximately 0.019.

Table 7 shows the Pearson correlation coefficients. The correlation coefficient is in most cases 0.5 or less. For simplicity, only the correlation between the dependent variable and the other variables are discussed.

The independent variables, initial return (IR) have a negative relation with the five-year post-issue cumulative return (CR5Y) and buy-and-hold return (BH5Y). While the standard deviation of stock return during the first month (STD_1M), the first-month, third- month, fourth-month, fifth-month and sixth-month cumulative return CR_M(1), CR_M(3), CR_M(4), CR_M(5),CR_M(6), the first-month, third- month, fourth-month, fifth-month and sixth-month buy-and-hold return BH_M(1), BH_M(3), BH_M(4), BH_M(5), BH_M(6), the standard deviation of stock returns during the first five-years after IPO (STD_5Y), the matching market five-year buy-and-hold return (MKTbh_5Y) and cumulative return (MKTcr_5Y), and the standard deviation of matching market returns (MKTstd_5Y) have a positive relation with the five-year post-issue cumulative return (CR5Y) and the standard deviation of stock return during the first month (STD_1M), the first-month, second-month, third-month, fourth-month, fifth-month and sixth-month cumulative return CR_M(1), CR_M(2), CR_M(3), CR_M(4), CR_M(5),CR_M(6), the first-month, second-month, third- month, fourth-month, fifth-month and sixth-month buy-and-hold return BH_M(1), BH_M(2), BH_M(3), BH_M(4), BH_M(5), BH_M(6), the standard deviation of stock returns during the first five-years after IPO (STD_5Y), the matching market five-year buy-and-hold return (MKTbh_5Y) and cumulative return (MKTcr_5Y), and the standard deviation of matching market returns (MKTstd_5Y) have a positive relation with the five-year post-issue buy-and-hold return (BH5Y).

Ⅴ. Regression Analysis

5.1 Effects of Market Information on Initial Returns

Table 8 shows the regression results mainly for the volume of IPOs on the initial returns on a subsequent IPO. Here, we empirically test whether initial returns are affected by the market information during the IPO period, as in Lowry and Schwert (2002). Considering two stock exchanges in mainland China, we test whether there are differences between the Shanghai and Shenzhen exchanges. For the t-statistics, we use White's (1980) heteroskedasticity-consistent standard error in regressions.

The Shenzhen Exchange dummy (Shenzhen) has a negative effect on initial returns (IR), but without much statistical significance, with a t-stat of -1.46. The initial returns (IR) from IPOs are negatively influenced by the volume of the IPO (M) or amount of proceeds from the IPO at a significance level of 1%, for the full sample and subsamples of Shanghai Exchange listed firms and Shenzhen Exchange listed firms. This result is consistent with Hanley (1993) who showed that initial returns are significantly related to the price update. Given a fixed number of shares for an IPO, the volume in proceeds is positively correlated with a higher offer price, thus leading to lower initial returns.

The equally-weighted IPO market returns measured with 30 other IPOs (Rm_30Ew) earlier have a positive effect on the initial return of a subsequent IPO, for the full sample and two subsamples by stock exchange. This result is consistent with Loughran and Ritter (2002) who showed that initial returns are significantly related to market returns during the 15 days prior to the offering, and partly consistent with Lowry and Schwert (2002) who showed a positive effect of market returns on

initial returns, without strong statistical significance.4 The number of IPOs in the same month (NIPO) as the initial public equity issuance has a negative effect on the initial return of a subsequent IPO, for the full sample and subsample from the Shanghai Stock Exchange, while the number of IPOs in the previous month (NIPO_L) has a negative effect on the initial return, yet without any statistical significance. This result is consistent with Lowry and Schwert (2002) who showed a strong pattern of negative correlations between current initial returns and past numbers of IPOs. The size of the IPO firms (Asset) also shows a somewhat negative effect on the initial return, with a statistical significance at only 10% for the Shanghai Exchange listed firms. This result is partially consistent with Lowry and Schwert (2002), who showed a strong negative effect on the initial return of a subsequent IPO. In general, the results of the basic model regression are consistent with those of prior studies like Loughran and Ritter (2002) and Lowry and Schwert (2002).

Table 8. Effects of Market Information on Initial Returns (Basic Models)

Variable		Full Sample		Shanghai Exchange		Shenzhen Exchange	
Observations		2153		825		1328	
F-value		57.24***		20.05***		54.79***	
R-squared		0.354		0.228		0.488	
VIF		1.02~1.63		1.05~1.46		1.01~1.58	
Variable Name	Coefficient	Coeff. (t-value)		Coeff. (t-value)		Coeff. (t-value)	
Shenzhen	β1	-0.071 (-1.46)					
M	β2	-0.315 (-10.59)	***	-0.355 (-8.91)	***	-0.263 (-5.16)	***
Rm-30e	β3	0.341 (6.85)	***	0.160 (2.31)	**	0.496 (7.10)	***
NIPO	β4	-0.010 (-3.89)	***	-0.012 (-2.42)	**	-0.003 (-1.38)	
NIPO_L	β5	0.000 (-0.11)		0.002 (0.40)		-0.002 (-0.74)	
Asset	β6	-0.006 (-0.56)		-0.033 (-1.74)	*	-0.003 (-0.22)	
Constant	α	4.272 (10.08)	***	5.496 (9.03)	***	3.329 (5.38)	***

Note 1. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

2. The estimates are the Huber White sandwich estimators.

Here we empirically test whether initial returns are affected by the equally- and/or value-weighted volume, distance, and initial returns of IPOs in the past. Table 9 shows the regression results mainly for the volume of IPOs and equally weighted factors of 30 prior IPOs, in addition to factors representing the market information during the IPO period, as introduced in Lowry and Schwert (2002), on the initial returns on subsequent IPOs. Furthermore, we test the differences between periods: before 2004 and after 2004 inclusive.

Table 9. Effects of IPO volume, distance on Initial Returns (Equally-weighted 30 IPOs)

Variable		Full Sample (1987~2015)		Sub-period Ⅰ (1987~2003)		Sub-period Ⅱ (2004~2015)	
Observations		2,207		1,007		1,200	
F-value		112.53***		14.41***		77.70***	
R-squared		0.354		0.228		0.488	
VIF		1.03~2.06		1.07~1.54		1.03~1.70	
Variable Name	Coefficient	Coeff. (t-value)		Coeff. (t-value)		Coeff. (t-value)	
Recent_D	β1	-0.413 (-5.48)	***				
M	β2	-0.350 (-12.26)	***	-0.621 (-9.53)	***	-0.176 (-7.21)	***
M_30	β3	0.049 (7.41)	***	0.372 (5.36)	***	0.022 (3.06)	***
Dist_30	β4	-0.014 (-3.21)	***	-0.041 (-1.32)		-0.0003 (-1.23)	
Rm_30Ew	β5	0.355 (7.44)	***	0.219 (3.70)	***	0.823 (16.39)	***

4 Similarly defined IPO market returns, both MKT and MKT+ have modest t-statistics, 1.47 and 1.26, respectively, in Lowry and Schwert (2002).

NIPO	β6	-0.010 (-4.09)	***	-0.002 (-0.55)		-0.002 (-1.39)	
NIPO_L	β7	-0.0004 (-0.15)		0.004 (0.82)		-0.0002 (-0.15)	
Asset	β8	0.007 (0.66)		0.098 (2.26)	**	-0.007 (-1.32)	
Constant	α	4.159 (10.99)	***	4.913 (4.65)	***	2.144 (6.65)	***

Note 1. *** and ** denote statistical significance at 1% and 5% level, respectively.

2. The estimates are the Huber White sandwich estimators.

The initial returns (IR) for the recent sample period (Recent_D) from 2004 to 2015 are lower than those from 1987 to 2003, at a significance level of 1%. This result reflects that the overall level of initial returns of IPOs in China is high until 2003, mostly well above 100%, and then declines to well below 100%. The gravity factor, representing the aggregate volume of 30 prior IPOs (M_30) has a positive effect on the initial return of a subsequent IPO, for the full sample and two subsamples by stock exchange at a significance level of 1%. However, another gravity factor, representing the aggregate distance of the 30 prior IPOs, (Dist_30) has a negative effect on the initial return of a subsequent IPO, only for the full sample at a significance level of 1%. Thus, the effects of the gravity factors on the initial returns are consistent with our expectations as in the hypotheses. All the other factors related to information with respect to the IPO firm and IPO market around the IPO date show basically the same results as in the basic model. These results are consistent with Loughran and Ritter (2002) and Loughran and Ritter (2002).

Table 10 shows the regression results, the initial returns (IR) on various factors, for example, the volume of IPOs and value-weighted factors of 30 prior IPOs, in addition to factors representing the market information during the IPO period, as introduced in Lowry and Schwert (2002). We also study the differences between 2 periods, before and after 2004 inclusive.

Table 10. Effects of IPO volume, distance on Initial Returns (Value-weighted 30 IPOs)

Variable		Full Sample (1987~2015)		Sub-period Ⅰ (1987~2003)		Sub-period Ⅱ (2004~2015)	
Observations		2,119		981		1,138	
F-value		46.38***		12.02***		49.42***	
R-squared		0.323		0.237		0.435	
VIF		1.03~1.58		1.07~1.63		1.01~1.49	
Variable Name	Coefficient	Coeff. (t-value)		Coeff. (t-value)		Coeff. (t-value)	
Recent_D	β1	-0.309 (-5.24)	***				
M	β2	-0.418 (-12.03)	***	-0.704 (-8.84)	***	-0.201 (-7.55)	***
M_30	β3	0.064 (8.75)	***	0.457 (5.01)	***	0.082 (10.58)	***
Dist_30	β4	-0.002 (-3.58)	***	-0.031 (-1.10)		-0.001 (-2.55)	***
Rm_30Vw	β5	0.237 (6.30)	***	0.197 (2.21)	**	0.203 (8.68)	***
NIPO	β6	-0.008 (-2.90)	***	-0.003 (-0.61)		-0.004 (-1.84)	*
NIPO_L	β7	-0.007 (-2.49)	**	-0.001 (-0.20)		-0.009 (-4.72)	***
Asset	β8	-0.030 (-2.44)	**	0.074 (1.66)	*	-0.056 (-6.93)	***
Constant	α	5.718 (13.03)	***	6.144 (5.31)	***	3.634 (9.79)	***

Note 1. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

2. The estimates are the Huber White sandwich estimators.

5.2 Effect of initial returns (IR) and Post-IPO initial stock return volatility on Post-IPO Underperformance

Table 11 shows the regression results mainly for the initial returns (IR) and Post-IPO initial stock return volatility (STD_1M) on the long-run Post-IPO stock performance. Here, we empirically test whether lung-run Post-IPO stock performance are affected by initial returns (IR) and Post-IPO initial stock return volatility (STD_1M) during five years after IPO, as in Ritter (1991), Santos (2010), and Sohn et al. (2012). Considering the different situation between the listed firms which have high lung-run Post-IPO stock performance with which have low lung-run Post-IPO stock performance, we test whether there are differences affect from initial returns (IR) and Post-IPO initial stock return volatility (STD_1M) between these different situations.

From the regression, for all IPOs, the initial returns (IR) has a negative and significant effect on the Five-year Cumulative Return (CR5Y), but the negative affect from initial returns (IR) to the Five-year Buy-and-Hold Return (BH5Y) is not significant. For both high lung-run performance IPOs and low lung-run performance IPOs, the initial returns (IR) has a negative and significant effect their Five-year Cumulative Return (CR5Y). While only for low lung-run performance IPOs, the initial returns (IR) has a negative and significant effect their Five-year Buy-and-Hold Return (BH5Y). This result shows that, in most situation, Post-IPO underperformance following the high initial returns (IR) in China.

Meanwhile, for all IPOs, the Post-IPO initial stock return volatility (STD_1M) has a negative and significant effect on both Five-year Cumulative Return (CR5Y) and Five-year Buy-and-Hold Return (BH5Y). But when considering the different situation between the high lung-run stock performance IPOs and low lung-run stock performance IPOs, the effect from Post-IPO initial stock return volatility (STD_1M) is going different.

As shown in Table 11, for low long-run return IPOs, the Post-IPO initial stock return volatility (STD_1M) has a positive and significant effect on both Five-year Cumulative Return (CR5Y) and Five-year Buy-and-Hold Return (BH5Y), while for high long-run return IPOs, the Post-IPO initial stock return volatility (STD_1M) has a negative and significant effect on both Five-year Cumulative Return (CR5Y) and Five-year Buy-and-Hold Return (BH5Y). This result shows that, for high lung-run return IPOs, high Post-IPO initial stock return volatility (STD_1M) exacerbates the Post-IPO Underperformance while for low lung-run return IPOs, high Post-IPO initial stock return volatility (STD_1M) eases the Post-IPO Underperformance.

Table 11. Effect of the initial returns (IR) and Post-IPO initial stock return volatility on Post-IPO Underperformance

Variable		Five-year Cumulative Return			Five-year Buy-and-Hold Return		
		Model 7-1	Low Long-run Return IPO	High Long-run Return IPO	Model 7-2	Low Long-run Return IPO	High Long-run Return IPO
Observations		2765	661	2104	2765	1193	1572
F-value		637.17***	279.6***	204.13***	197.24***	206.09***	75.29***
R-squared		0.7342	0.8228	0.5152	0.46	0.6543	0.3422
VIF		1.04~3.56	1.02~3.46	1.05~3.37	1.03~3.69	1.02~2.39	1.05~4.10
Variable Name	Coefficient	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)
High_D	β1	0.971 *** (44.71)			1.805 *** (30.78)		
IR	β2	-0.041 *** (-4.5)	-0.046 *** (-4.01)	-0.035 *** (-3.04)	-0.016 (-0.57)	-0.032 *** (-2.99)	-0.021 (-0.4)
STD_1M	β3	-3.041 *** (-5.08)	2.498 *** (2.64)	-3.976 *** (-5.6)	-6.094 *** (-3.21)	2.799 *** (3.12)	-10.403 *** (-3.48)
R_m(1)	β4	0.101 *** (3.42)	0.143 ** (2.15)	0.075 *** (2.2)	0.291 *** (7.13)	0.113 *** (1.87)	0.296 *** (5.12)
R_m(2)	β5	0.181 *** (3.7)	-0.040 (-0.46)	0.219 *** (3.85)	0.523 *** (3.57)	0.063 (0.86)	0.719 *** (3.25)
R_m(3)	β6	0.031 (0.61)	0.028 (0.34)	0.038 (0.63)	0.284 * (1.93)	0.075 (1.07)	0.254 (1.13)
R_m(4)	β7	0.098 ** (1.98)	0.055 (0.62)	0.116 ** (2.01)	0.591 *** (4.08)	0.273 *** (3.92)	0.814 *** (3.7)
R_m(5)	β8	0.080 (1.55)	0.142 * (0.073)	0.073 (1.18)	0.203 (1.33)	0.203 *** (2.86)	0.236 (1.01)
R_m(6)	β9	0.158 *** (3.08)	-0.078 (0.332)	0.192 *** (3.14)	0.242 (1.59)	0.077 (1.12)	0.389 (1.61)
STD_5Y	β10	37.213 *** (22.53)	4.205 (1.16)	40.717 *** (21.19)	29.315 *** (5.63)	8.910 *** (3.47)	51.373 *** (6.35)
MKTr_5Y	β11	0.925 *** (49.33)	1.004 *** (19.14)	0.922 *** (37.93)	1.042 *** (29.32)	0.562 *** (41.03)	1.722 *** (25.9)
MKTstd_5Y	β12	-24.690 *** (-8.82)	0.382 (0.924)	-28.484 *** (-8.23)	-32.350 *** (-3.91)	-8.996 *** (-2.58)	-45.346 *** (3.21)
Constant	∝	-0.801 *** (-19.18)	-0.511 *** (-7.79)	0.157 *** (2.93)	-2.777 *** (-7.26)	-0.801 *** (-4.17)	-2.904 *** (-4.72)

Note) ***, **, * denote statistical significance at the 1% and 5% levels, respectively, using a two-tailed test.

5.3 Effect of lock-up policy on Post-IPO Underperformance

Table 12 shows the regression results mainly for the lock-up policy (Lock_D), Post-IPO initial stock return volatility (STD_1M) and the standard deviation of stock returns during the first month after open-up the locked trading stock (STD_OPM) on the long-run Post-IPO stock performance. Here, we empirically test whether lung-run Post-IPO stock performance are affected by lock-up policy (Lock_D) and Post-open-up stock return volatility (STD_OPM) during five years

after IPO. Considering the different situation between the Lock-up IPOs and Non Lock-up IPOs, listed firms which have introduced the lock-up policy may have different Post-IPO long-run stock performance.

From the regression, the lock-up dummy(Lock_D) has a positive and significant effect on Five-year Cumulative Return (CR5Y) which means that the lock-up IPOs have higher Five-year Cumulative Return (CR5Y) than non-lock-up IPOs on average. While the lock-up dummy(Lock_D) has no significant effect on Five-year Buy-and-Hold Return (BH5Y). This result shows shat the lock-up policy partial eases the Post-IPO Underperformance.

For lock-up IPOs, the standard deviation of stock returns during the first month after open-up the locked trading stock (STD_OPM) has a negative and significant effect on Five-year Cumulative Return (CR5Y) but do not has any significant effect on Five-year Buy-and-Hold Return (BH5Y). This result shows that, the stock return volatility after open-up the locked trading stock can exacerbate the Post-IPO Underperformance.

Table 12. Effect of the lock-up policy on Post-IPO Underperformance

Variable		Five-year Cumulative Return			Five-year Buy-and-Hold Return		
		Model 8-1	Non Lock-up IPO	Lock-up IPO	Model 8-2	Non Lock-up IPO	Lock-up IPO
Observations		2765	1531	1234	2765	1531	1234
F-value		547.52***	387.71***	228.03***	169.13***	109.65***	71.56***
R-squared		0.7346	0.7667	0.7053	0.4599	0.48	0.4266
VIF		1.04~3.69	1.07~4.31	1.04~2.47	1.05~3.79	1.07~4.24	1.03~2.21
Variable Name	Coefficient	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)
Lock_D	β1	0.043 ** (2.19)			-0.069 (-1.13)		
IR	β2	-0.035 *** (-3.69)	-0.030 *** (-2.83)	-0.074 *** (-3.45)	-0.023 (-0.8)	-0.032 (-0.93)	-0.067 (-1.12)
STD_1M	β3	-2.943 *** (-4.9)	-3.866 *** (-5.71)	-1.183 (-0.88)	-6.133 *** (-3.2)	-8.729 *** (-3.69)	-0.515 (-0.14)
STD_OPM	β4	-0.953 (-1.45)	-0.529 (-0.72)	-3.007 ** (-2.11)	-0.627 (-0.31)	-2.531 (-1.02)	1.546 (0.38)
R_m(1)	β5	0.118 *** (3.91)	0.207 *** (5.85)	0.136 ** (2.08)	0.284 *** (6.75)	0.333 *** (6.71)	0.171 (1.34)
R_m(2)	β6	0.190 *** (3.87)	0.332 *** (5.69)	0.054 (0.6)	0.527 *** (3.56)	0.845 *** (4.43)	0.127 (0.51)
R_m(3)	β7	0.056 (1.09)	0.120 * (1.96)	0.082 (0.89)	0.269 * (1.79)	0.415 ** (2.19)	0.166 (0.63)
R_m(4)	β8	0.119 ** (2.34)	0.205 *** (3.42)	0.072 (0.77)	0.589 *** (3.99)	0.791 *** (4.3)	0.432 (1.63)
R_m(5)	β9	0.086 * (1.67)	0.193 *** (3.23)	0.026 (0.26)	0.201 (1.32)	0.503 *** (2.67)	-0.275 (-1)
R_m(6)	β10	0.161 *** (3.15)	0.253 *** (4.13)	0.093 (1.03)	0.236 (1.55)	0.332 * (1.7)	0.196 (0.77)
STD_5Y	β11	37.176 *** (22.13)	30.443 *** (15.59)	55.928 *** (15.89)	30.166 *** (5.72)	21.708 *** (3.34)	47.961 *** (4.79)
MKTr_5Y	β12	0.927 *** (49.27)	0.958 *** (40.92)	0.810 *** (23.6)	1.038 *** (29.09)	1.065 *** (23.82)	0.957 *** (14.83)
MKTstd_5Y	β13	-22.504 *** (-7.69)	-15.603 *** (-4.78)	-43.074 *** (-5.66)	-34.135 *** (-3.93)	-21.808 ** (-2.15)	-47.430 ** (-2.16)
Constant	∝	-0.843 *** (-18.49)	-0.751 *** (-14.91)	-0.919 *** (-9.39)	-2.677 *** (-6.58)	-3.679 *** (-6.93)	-1.818 *** (-2.72)

Note) ***, ** denote statistical significance at the 1% and 5% levels, respectively, using a two-tailed test.

VI. Conclusion

In this study, we test whether the initial returns (IR) or the phenomena of underpricing of IPOs is also one of the causes of Post-IPO Underperformance in China. We study the market information effect on the underpricing of IPOs first and study the effect of the other causes of Post-IPO Underperformance such as the Post-IPO initial stock return volatility and lock-up policy. Multivariate regressions are conducted using all the IPOs of firms listed on the Shanghai and Shenzhen exchanges from 1987 to 2015. Our findings can be summarized as follows:

First, while that the magnitudes of weighted (equally or value weighted) IPO volumes in the past have a positive effect on the magnitude of IPO returns in the future, the IPO volume itself has a negative effect on the magnitude of IPO returns in the future.

Second, the magnitude of weighted IPO returns in the past has a positive effect on the magnitude of IPO returns, while simultaneously reflecting the effects of both time-span and magnitude in returns and volume for most of the information used in Lowry and Schwert (2002).

Third, the effects of market information in our study are only partially consistent with Loughran and Ritter (2002) and Lowry and Schwert (2002), as higher market returns and larger numbers of IPOs only result in more IPOs in the subsequent period during the period before 2004, whereas this phenomenon has since reversed. Plus, the statistical reliability of the lead-lag relations with the initial returns and volume of IPOs in the subsequent period over time and the impact of market and firm-specific information are better explained by the IPOs on the Shenzhen Stock Exchange than the IPOs on the Shanghai Stock Exchange.

Fourth, in most situation, Post-IPO underperformance following the high initial returns (IR) in China.

Fifth, for high lung-run return IPOs, high Post-IPO initial stock return volatility (STD_1M) exacerbates the Post-IPO Underperformance while for low lung-run return IPOs, high Post-IPO initial stock return volatility (STD_1M) eases the Post-IPO Underperformance.

Sixth, the lock-up policy partial eases the Post-IPO Underperformance and the stock return volatility after open-up the locked trading stock can exacerbate the Post-IPO Underperformance.

Thus, the Post-IPO Underperformance phenomena are more clearly explained based on the effects of prior initial returns and volume, IPO underpricing, initial stock return volatility and lock-up policy in China. Notwithstanding, there is still a need for more explanation on the differences in trends, exchanges, and idiosyncrasies in firms, and more detailed investigation into the lengths of lead-lag relations and underlying economic factors.

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