The Different Valuation of Offer Price By Market Conditions:

The Case of Korean IPO Market

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This paper describes our review of the IPO pricing mechanism under different market conditions ("hot markets" versus "cold markets"). Our study generates the following results. First, the value of the offer price and that of the matching increase along with market conditions. We then demonstrate that the median relative valuation (RV) of the hot market IPO is lower than that of the cold market IPO. The result also indicates that there is a significantly negative relationship between the market condition and the RV. This implies that the market valuation is reflected partially in the offer price under hot market conditions. Finally, our results shows that the amount of the less reflected portion of market value in the offering price eventually affects the initial returns.

Field of Research: IPO, Offering Price, IPO Market Timing, Hot Issue Market

1. Introduction

There have been many debates as to whether IPOs are underpriced or undervalued. Some researchers have argued that issuers intentionally underprice their shares, assuming that the short-term after-market equilibrium prices are reflective of the intrinsic value of the offering stocks, in order to induce investor participation in the IPO market under asymmetric information conditions of between issuers and investors (Asymmetric Information Theory, Rock, 1986; Signaling Hypothesis, Grinblatt and Hwang, 1989); Issuers and

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Institutes (Partial adjustment to private information hypothesis, Benvensite and Spindt, 1989). This supports the notion of a high initial return phenomenon, but does not explain long-run underperformance.Other studies have argued that IPOs are not underpriced, thereby suggesting the fad (bubble) hypothesis. Although offering stocks are priced at their fair value, IPO markets continue to show high initial returns owing to the "fad" phenomenon in the market on the offering day. Over time, investor exuberance tends to fade, thus resulting in a long-run underperformance (Ritter, 1991; Loughran and Ritter, 1995).

Recently, however, some have argued that the IPO pricing mechanism functions differently by market conditions. Loughran and Ritter (2002) suggest the Partial Adjustment to Public Information hypothesis that IPOs exhibit high initial returns, as issuers partially reflect the market value in the offer price. Ljungqvist *et al.* (2006), Francois (2005), and Edelen and Kadlec (2005) have also proposed a model such that the offering price is determined between the intrinsic value and its market value under hot market conditions, where there are many overoptimistic investors. As a result, they evidence high initial returns, whereas under cold market conditions, the offer price is set around its intrinsic value. For example, InnoBlue IPOs were offered at ₩4,000 a share in the hot market conditions. Its relative value to the comparable company is 0.27, which is greatly under-valued. Because of its under-valuation, its initial return(IR) on the offering day jumped up to 124%

In accordance with the 'Market Timing Hypothesis' (Ibbotson and Jaffe, 1975; Ritter, 1980; Lowry and Schwert, 2002; Lowry, 2003; Pastor and Veronesi, 2005), many IPO firms take advantage of favorable market conditions and actually adjust the IPO prices upward in order to reflect market value during the book-building period. However, the final offering prices still do not fully reflect the market conditions, evidencing high initial returns on the offering day. This is yet another anomalous aspect of the IPO market. Loughran and Ritter (2002) demonstrated that issuers more highly value the capital gain obtained from the retained shares than the proceeds on the offering day. As a result, they rarely upset the underpricing of the IPO. Daniel (2002) has suggested that issuers wish to go public quickly in a hot market, and thus their bargaining position is relatively lower than that of the underwriters' and institutional investors' who wish the IPOs to be underpriced. Francois (2005) has asserted that underwriters with their attendant price-support obligations under-price IPOs in cases in which market conditions fall after hot market conditions upon initial

offering.

Thus far, however, only nominal research has been conducted regarding the comparison of the IPO pricing mechanisms between hot and cold market conditions. Although Purnanandam and Swaminathan (2004) have assessed the valuation of IPOs, they, too, have neglected to consider the effects of market conditions on the pricing mechanism. In addition, since July 2002, Korean IPO firms have been supposed to present their comparative firms' financial data in the prospectus and to demonstrate how the offer prices are determined relative to the value of comparable firms. However, we were unable to find any previous studies addressing the manner in which the relative valuation (RV) of the offer price over matching firms is related to the market conditions in previous studies, as well as in Korean IPO markets.

Next, there have been a few studies assessing the manner in which the RV affects the initial return. In other words, in cases in which IPOs evidence a high initial return for not fully reflecting the market valuation to the offer price, it must be determined how RV, as another measure of market valuation, is associated with the initial returns in cases in which similar market conditions or upward adjustments pertain. The Korean stock market employs a book-building mechanism as a "going public" procedure. IPO firms file a prospectus with a preliminary offer range to the Financial Supervisory Commission. Underwriters then gather the pre-issue information from general investors during the book-building period. On the basis of the information obtained from the market, the firms and underwriters finally determine the final offer price for IPO security. With the revision of the "Rule of the Securities Underwriting Process" in July 2002, the Korean government has deregulated the firms' determination regarding the preliminary offer range of the offering price. Then, Korean IPO firms generally announce several listed companies as comparative firms in the prospectus and determine the offering prices on the basis of the relative valuation of IPO firms over matching companies -comparable firm multiples- in conjunction with the use of their accounting information (Choi, 2005).

In this study, therefore, we have conducted a comparison of the relative valuation (RV) under hot and cold market conditions under the assumption that the market value of the matching companies in the prospectus is an alternative measurement to the offering firm's market value. We also assessed the RV of the offer price over its market value in order to determine whether it evidences some additional explanatory power for the initial returns, even after controlling

for the market conditions. Finally, we have attempted to determine whether underwriters or issuers take advantage of 'hot market conditions' by comparing the time period taken by issuing firms to go public from the day on which the preliminary prospectus is filed to the offering day by different market conditions. Unlike in the study of Purnanandam and Swaminathan (2004), in which the matching firms were selected on the bases of industry and profit criteria, we have utilized the matching firms that the IPO firms and the underwriters, themselves, have already selected in the prospectus for the purpose of comparable firm multiples. In this fashion, we can determine the issuers' or underwriters' intention in pricing IPOs under different market conditions.

The analyst results indicate that the average value of the RV in a hot market is lower than that of the cold market; namely, there is a significantly negative relationship between the market condition and the relative valuation. We also determine that RV is related negatively to the initial returns in the regression. This result implies that the amount of market value, which is not fully reflected in the offer price, eventually significantly influences the initial returns. Finally, we determine that it takes a much shorter time for IPO firms to go public under hot market conditions. This implies that underwriters or issuers wish to take advantage of market conditions by going public sooner.

The remainder of this paper is organized as follows. In Section 2, we provide the hypotheses, describe our sample, and elucidate our data sources. In Section 3, we assess the hypotheses and show the results of empirical analysis. Section 4 states our conclusions.

2. Methodology: Hypotheses, Data, Variables, and the Model

2.1 Hypotheses

According to the results of studies conducted by Loughran and Ritter (2002), Derrin (2005), Ljungqvist *et al.* (2006), and Edelen and Kadlec (2005), the offer prices of IPO firms under hot market conditions may be relatively undervalued to their market valuation. More specifically, it is likely that the relative valuation of the offer price is lower under hot market conditions than under cold market conditions. Bouis (2003) and Ljungqvist *et al.* (2006) present a model in which the offer price of a firm is set by adjusting its market valuation partially under hot market conditions due to the difference in opinion between rational and

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sentimental investors.

Edelen and Kadlec (2005) propose a model in which issuers partially adjust the offer price in response to changes in market valuation during the waiting period, so as to maximize their expected surplus from going public. Derrin (2005) also suggests a partial adjustment pricing mechanism under hot market conditions under the constraint of short selling and price support accountability.Throughout these studies, there exists a consensus that offering firms may partially reflect the market valuation, and that as a consequence, the relative valuation over the market value tends to be lower under hot market conditions. On the contrary, there is no over-optimism in a cold market, and thus the firm is able to fully reflect the market value to the offer price. Consequently, the relative valuation is higher under cold market conditions than hot market conditions. We present this in the following hypothesis:

H1: The relative valuation of the offer price over the market value of the matching company shown in the prospectus will be lower under hot market conditions than cold market conditions.

As regards the high initial return phenomenon observed under hot market conditions, some previous studies have asserted that there is a high initial return because the market value is partially reflected in the offer price. In this paper, we explore the relationship between the relative valuation and the initial return under the following hypothesis.

H2: The initial return has a positive relation with the market condition and a negative relation with the relative valuation (RV).

We have developed this hypothesis from prior research, which argues that the less reflected portion of the market value, stemming from the overoptimistic investors, in the offer price is realized as an initial return. Loughran and Ritter (2002), Ljungqvist et al. (2006), Edelen and Kadlec (2005), and Bouis (2003) have asserted that the IPOs under hot market conditions evidence high initial returns, as the offer price partially reflects the market value. If this is true, the initial return will be influenced by the relative valuation of the offer price, as well as the pertaining market conditions. In other words, we can infer that the lower the relative valuation of the offer price over the market condition is, the more undervalued will be the offer price. Consequently, this more undervalued portion, in terms of relative valuation, will be realized as higher initial returns. Following

this logic, we can expect that a negative relationship will exist between the initial return and the relative valuation, even after controlling for market conditions.

High initial returns are still observed, although many offering firms conduct 'market timing' in order to take advantage of good market conditions, and actually adjust the IPO prices upward to reflect the market value during the book-building period. In an effort to explain this phenomenon, Daniel (2002) suggests that issuers want to go public quickly under hot market conditions, and so their bargaining position is relatively lower than that of the underwriters' and institutional investors', who want the IPOs to be underpriced. Thus, we can infer, more specifically, that it takes significantly less time for offering firms to go public under hot market conditions. We also infer that the shorter the time is required to go public, the more undervalued it will be, which results in a positive relationship with IR (Initial Return). We explore these relations under the following hypothesis.

H3: The period from the filing date of the preliminary prospectus to the offering date is shorter under hot market conditions than under cold market conditions, and thus it evidences a positive relationship with RV and a negative relationship with IR.

2.2 Data

The sample firms in this study encompass the IPOs in the Korean KOSDAQ market during the period from September 2002 through December 2005. Due to the deregulation of the offer price determination from July 2002, the majority of IPO firms determine the preliminary offer range by using the accounting information in conjunction with comparable firm multiples. The matching firms shown in the prospectus have been selected by both the underwriters and the IPO firms from those firms belonging to the same industry, and evidence a similar firm size among the firms listed in the KOSDAQ market. This study differs from that of Purnanandam and Swaminathan (2004), which selected the matching firms by industry and profit criteria. Instead, we have utilized the matching firms that the IPO firms and the underwriters, themselves, have already selected in the prospectus for the purpose of comparable firm multiples. In this way, we can notice the issuers' or underwriters' intention in pricing IPOs under different market conditions.

There are 224 IPOs in our sample period. We have excluded the financial firms, IPOs not utilizing comparable firm multiples, and IPOs whose matching firms are less than one year of age, and whose data are not currently available. As a result, 187 final sample firms fulfilling these criteria were employed in this study. Table 1 shows the distribution of IPO firms and the matching firms by year, and the distribution of IPOs by market condition and by year. As we can see in Panel A, the yearly distribution of the final sample IPOs is similar to that of all IPO firms over the same period. The number in parentheses is the percent of the number of firms newly listed in each year over the total number of IPO firms over the entire period. The number of matching firms is larger than that of the sample firms, as each IPO firm includes at least more than three matching firms in their prospectus. This study utilizes the average value of financial data of the matching firms for the following analyses.

Table 1
The distribution of IPOs and matching firms by the market condition and year criteria

This table shows the distribution of IPOs and matching firms that we used and the distribution of sample IPOs by the market condition and by year criteria. The numbers in parentheses are the percent ratios of the number of firms per each year over the total number of the firms for the entire sample period and the ratios of the firms that each market condition had per year.

Panel A. The yearly distribution of IPO firms and matching firms

	After 2002.9	2003	2004	2005	Total
All IPO firms	30(13%)	71(32%)	52(23%)	71(32%)	224(100%)
Sample IPO firms	20(11%)	66(35%)	43(23%)	58(31%)	187(100%)
Matching firms	46	201	150	256	653

Panel B. The distribution of IPOs by market condition and by year

Market condition	3-month Industry return	The number of IPOs by year				total
		2002	2003	2004	2005	
Hot market	0.3715%	3(15%)	22(33%)	3(7%)	38(66%)	66(100%)
Medium market	0.0129%	4(20%)	16(24%)	21(49%)	15(26%)	56(100%)
Cold market	-0.2578%	13(65%)	28(42%)	19(44%)	5(9%)	65(100%)
Total by year	0.0453%	20(100%)	66(100%)	43(100%)	58(100%)	187(100%)

The matching firms presented in Panel A include only those firms that have been listed on the market for more than one year. The selection criteria for the matching firms in the prospectus are relatively strict. First, the matching firms must belong to the same industry as the IPO firms. In addition, they must have similar businesses with the offering firms. In the next step, the matching firms must be within the same fiscal month. The audit reports also must be considered. Finally, the final matching firms must have an operating income and financial structure similar to that of the IPO firms. Given these strict criteria, we can then argue that the market value of the matching firms listed in a prospectus is a good proxy for measuring the market valuation of the IPO firms. For our study, we have obtained data on IPOs from the KOSDAQ market of the Korea Exchange. The data for the valuation method of offer prices, ownership structure, and matching firms were collected from the prospectus shown in the DART (Data Analysis, Retrieval and Transfer System) system of the Financial Supervisory Service. The accounting and financial data are available from the Kis-Smat and Kis-Value databases maintained by the Korea Information Service.

2.3 Variables

2.3.1 Hot market condition vs. Cold market condition

Prior to the initiation of the central part of our analysis, we are required to segment the entire sample by market condition. In accordance with the studies of Derrin and Womack (2003), and Derrin (2005), market conditions are defined as the average rate of return of the industry index to which the IPO firms belong for three months up to the offering date. We then divided these IPO firms into three groups by the size of the industry rate of return. The 35% of firms with the highest industry rates of return are grouped into the 'IPOs in hot market condition' group and the 35% of the firms with the lowest industry rates of return are grouped into the 'IPOs in cold market condition' category.

Panel B of Table 1 shows the yearly IPO portfolios by market condition. The average industry return of the portfolio for three months under hot market conditions is 0.37%, which shows a sharp contrast with that observed under cold market conditions, -0.26%. The number of sample firms which belong to IPOs under hot market and cold market conditions is 66 and 65, respectively.

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Among the samples in the years 2003 and 2005, 33% and 66% belong to the 'IPOs in the hot market condition,' group, respectively. In the years 2002 and 2004, 65% and 44% are grouped into the 'IPOs in the cold market condition' category, respectively. igure 1 shows the moving average of three-month market returns in the KOSDAQ market. It demonstrates an increasing trend in the latter half of 2003 and in 2005, and shows a decreasing trend in the latter half of 2002, in the first half of 2003, and in 2004. These trends are consistent with the results shown in Table 2. Figure 2 graphs the monthly market-adjusted initial returns of the IPOs. The parallel line on the graph represents the average monthly market-adjusted initial return, 42%. Figure 1 illustrates a trend similar to that shown in Figure 2.
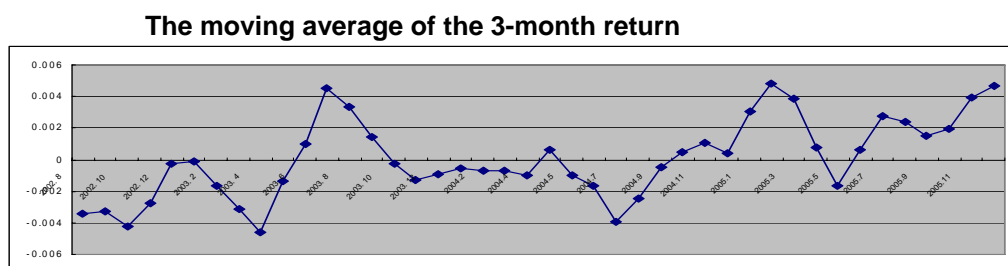
Figure - 1

The moving average of the 3-month return

Figure 2
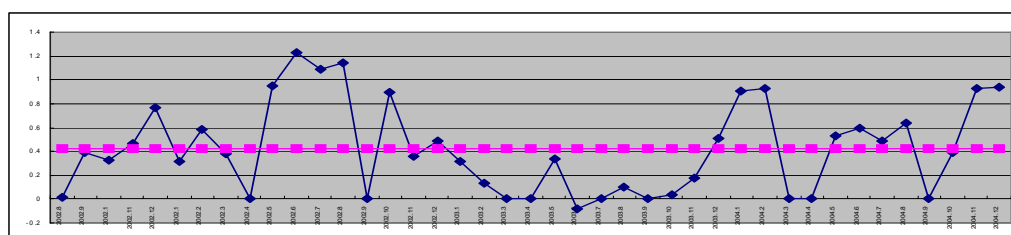**The monthly market-adjusted initial return of the IPOs**

2.3.2 The relative valuation of the offer price over the market value

Choi (2005) determined that many underwriters use price-multiple methods such as PER and PSR when they value the offer prices of IPO firms and set preliminary offer ranges in the filing of a prospectus. Purnanandam and Swaminathan (2004) also attempted to determine whether the IPOs were

under-valued or over-valued relative to their intrinsic values using price-multiple methods including P/S, P/EBITDA, and P/E. Given that the value of a matching firm is the market valuation on IPOs, which is counter to the assumptions of Purnanandam and Swaminathan (2004), this study computes the relative valuation of the offer price over the matching firms, RVs, by dividing the offer price multiples with the matching firm's price multiples. The model utilized in this study was adapted from the study of Purnanandam and Swaminathan (2004).

The offer price multiples for IPOs are computed as follows:

$$\frac{P}{S}_{IPO} = \frac{\textit{offer price} \times \textit{total shares issued on the offering day}}{\textit{prior fiscal sales}}$$

$$\frac{P}{EBITDA}_{IPO} = \frac{\textit{offer price} \times \textit{total shares issued on the offering day}}{\textit{prior fiscal EBITDA}}$$

$$\frac{P}{E}_{IPO} = \frac{\textit{offer price} \times \textit{total shares issued on the offering day}}{\textit{prior fiscal earnings}}$$

The price multiples for matching firms are computed as follows: Total shares and market price are computed on the day immediately prior to the offering date.

$$\frac{P}{S}_{matching} = \frac{\textit{market price} \times \textit{total shares issued}}{\textit{prior fiscal sales}}$$

$$\frac{P}{EBITDA}_{matching} = \frac{\textit{market price} \times \textit{total shares issued}}{\textit{prior fiscal EBITDA}}$$

$$\frac{P}{E}_{matching} = \frac{\textit{market price} \times \textit{total shares issued}}{\textit{prior fiscal earnings}}$$

The RV ratios of the IPO firm relative to the market value on the basis of a variety of price multiples are computed as follows:

$$(RV)_{sales} = \frac{(P/S)_{IPO}}{(P/S)_{matching}}$$

$$(RV)_{EBITDA} = \frac{(P/EBITDA)_{IPO}}{(P/EBITDA)_{matching}}$$

$$(RV)_{sales} = \frac{(P/E)_{IPO}}{(P/E)_{matching}}$$

2.4 The model for logistic regression

This study utilizes logistic regression to evaluate the first hypothesis, namely that the relative valuation of the offer price over the market value of the matching firms is lower under hot market than cold market conditions. We attempt to determine whether the market condition has a deterministic power regarding the level of relative valuation. The logistic model is:

$$RV = a + b \cdot mark + c \cdot adj + d \cdot overhang + e \cdot VC + f \cdot perds + g \cdot \ln(asset)$$
$$+ h \cdot age + i \cdot profit$$

RV : high $(RV)_{EBITDA} = 1$,　low $(RV)_{EBITDA} = 0$

$mark$: the return of the industry index where the IPO company

　　　belongs for 3 months preceding the offering date.

adj : the adjustment rate of the final offer price relative to the midpoint

　　　of the initial price range.

$overhang$: the ratio of the pre-IPO equity stake over the selling stock

　　　in the IPO (pre IPO shares/offering stocks on IPO)

VC : dummy variable, 1 if the IPO is venture capital backed, and 0 if

　　　otherwise

$perds$: the periods from the filing of the preliminary prospectus to the

　　　offer date

$\ln(asset)$: ln (Asset)

age : the age of the firm

$profit$: EBITDA marginal rate = (EBITDA/sales)×100

The dependent variable RV for logit analysis is 1 if the relative valuation of IPO firms belongs to the highest RV group, and 0 if it is in the lowest RV group. The independent variables are those that have been shown in previous studies to be associated with the relative valuation. Among the independent variables, the variable $mark$ is the return of the industry index where the IPO firms belong for three months prior to the offering date. The variable $mark$ is expected to evidence a negative sign, as the RV is lowered as the market condition improves. The variable adj is the adjustment rate of the final offer price relative to the midpoint of the initial price range. The coefficient of adj is expected to be

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positive, as the *RV* increases with upward adjustments in the final offer price. The variable *overhang* is the ratio of pre-IPO stocks over the offering stocks. From the Prospect Theory as suggested by Loughran and Ritter (2002), we can expect the *overhang* coefficient to be negative, as pre-IPO shareholders prefer for the IPO to be undervalued for a capital gain following the listing. The variable *VC* is a dummy variable, which is 1 in cases in which the IPO is backed by venture capital and 0 if it is not. The effect of *VC* on the relative valuation has been a source of some controversy. It may have had a positive deterministic power for the RV in that *VC* may have lowered the ex-ante uncertainty of the IPO firms, whereas it may have evidenced a negative sign if we consider venture capital as one of the existing shareholders allowing the underpricing. The variable *perds* indicates the periods from the filing date of the preliminary prospectus to the offering date. Its coefficient frequently evidences a positive sign, as the issuer is likely to accept undervaluation of the offer price in order to finish the IPO process as early as possible under hot market conditions. The other variables, $\ln(asset)$, *age*, and *profit*, are control variables that affect the relative valuation. In Panel A of Table 2, we summarize the expected signs from this analysis.

2.5 The Regression Analysis model

In order to test the second hypothesis, the initial return is positively related to the market condition and negatively related to the relative valuation; we run a regression of the initial returns (IR) of the sample firms with the market condition, relative valuation (RV), and the other control variables. Loughran and Ritter (2002) demonstrated that both the adjustment rate and the market condition are related positively to the initial return. Bradley and Jordan (2002) also present the proxy of public information, including market condition, overhang, file-range amendments, and venture capital backing, among others, and demonstrate that these variables have a very significant effect on the initial return. In this study, we assess the effects of RV and market conditions on the initial return after controlling for those variables. The regression model utilized is as follows:

$$IR = a + b \cdot mark + c \cdot RV + d \cdot adj + e \cdot overhang + f \cdot VC + g \cdot perds$$
$$+ h \cdot age + i \cdot profit + \ln(procds)$$

IR : the market-adjusted initial return

$mark$: the return of the industry index where the IPO company

belonged in the 3 months prior to the offering date

RV : the relative valuation of the offer price over matching firms

adj : the adjustment rate of the final offer price relative to the midpoint
of the initial file price range

$overhang$: the ratio of the pre-IPO equity stake over the selling
stock in the IPO

VC : IPO venture capital backed = 1, else=0

$perds$: the periods from the filing date of the preliminary prospectus
to the offer date

age : the age of the firm

$profit$: EBITDA marginal rate, (EBITDA/Sales)×100

$\ln(procds)$: ln (proceeds), total amount of IPO proceeds

The dependent variable IR is the market-adjusted initial return of the IPOs. Among the independent variables, $mark$, the industry rate of return, and adj, the adjustment rate, are likely to be positively related to IR from the "Partial Adjustment to the Public Information Hypothesis" suggested by Loughran and Ritter (2002). The RV, the relative valuation of the IPO stocks over the matching firms, is expected to be negatively related to IR. As was mentioned in the previous section, the lower the RV is, the less market value is reflected in the IPOs. Thus, the less reflected portion of the market value (more undervaluation) to the offer price is realized in the form of higher initial returns. According to the 'Prospect Theory' offered in the study by Loughran and Ritter (2002), pre-IPO shareholders do not become upset, although the offer price is undervalued, as they considered not only the offer price but also the capital gain from the retaining stocks. Thus, we anticipate that the variable $overhang$ will have a positive effect on the IR. VC is a dummy variable, which is set to 1 in cases in which the offering firm is backed by venture capital and 0 if otherwise. There has been some controversy regarding the effect of VC on the IR. Megginson and Weiss (1991) and Gulati and Higgins (2003) have argued that the venture capital-backed firms evidence lower initial returns, as venture capital can reduce the uncertainty and asymmetric information conditions. On the contrary, Ljungqvist and Wilhelm (2003) have reported that the venture capital-backed IPO firms evidence larger IR. The variable $perds$, the periods from the date of prospectus filing to the offering date, is expected to exert a negative effect on the IR. Under hot market conditions, the issuer has an incentive to finish the

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IPO process as soon as possible in order to take advantage of the noise traders' expectations. This incentive permits the issuers to allow for IPOs to be undervalued. Thus, the less time it takes for firms to complete the IPOs, the more the offer price is undervalued. The variable age, the age of a firm, is expected to exert a negative effect on the IR. According to 'the windows of opportunity' theory, younger firms tend to go public under hot market conditions and are undervalued more profoundly due to their higher degree of uncertainty. We summarize the expected effects of each variable on the IR in Panel B of Table 2.

Table 2
The expected results from analysis

This table shows the expected signs from the regression analysis. Panel A shows the expected signs from the logistic regression to determine whether the market condition has a deterministic power to the extent of the relative valuation, RV. The logistic regression model is as follows;

$$RV = a + b \cdot Mark + c \cdot adj + d \cdot overhang + e \cdot VC + f \cdot perds + g \cdot \ln(asset) + h \cdot age + i \cdot profit$$

Panel B shows the expected signs of each of the coefficients in the regression analysis to determine whether the relative valuation of IPOs affects the initial returns after controlling for the adjustment rate and market conditions. The regression model is as follows;

$$IR = a + b \cdot Mark + c \cdot RV + d \cdot adj + e \cdot overhang + f \cdot VC + g \cdot perds + h \cdot age + i \cdot profit + \ln(procds)$$

Panel A. The expected signs from the logistic regression

Independent variable	mark	adj	overhang	VC	perds	ln(asset)	Age	profit
Coefficient expectation	-	+	-	?	+	+	+	+

Panel B. The expected signs of each of the coefficients in the regression analysis

Independent variable	mark	RV	Adj	overhang	VC	perds	age	Profit	ln(procds)
Coefficient expectation	+	-	+	+	?	-	-	-	-

RV is defined as the ratio of $(P/EBITDA)_{IPO}$ over $(P/EBITDA)_{matchingcompany}$. IR is measured as the market-adjusted initial return on the day of offering. $mark$ is defined as the return of the industry index where the IPO company belonged in the three months prior to the offering date. adj is measured as the adjustment rate of the final offer price relative to the midpoint of the initial file price range. $overhang$ is defined as the ratio of the pre-IPO equity stake over the selling stock in the IPO. VC is a dummy variable, and is set to 1 if the offering firm is backed by venture capital and 0 if otherwise. $perds$ is the period from the date of prospectus filing to the offering date. $\ln(asset)$ is the natural logarithms of asset. age is the age of the offering firm. Profit is the EBITDA marginal rate, (EBITDA/Sales)×100. $\ln(procds)$ is the natural logarithms of the total amount of IPO proceeds.

3. Empirical Results

3.1 Descriptive statistics

Table 3 provides the descriptive statistics of the variables utilized in the subsequent analyses. In panel A, the sample consists of 187 offering firms. The average industry return of the IPO firms for the three-month period preceding the offering date is 0.05%. The average of adj is -6.38%, which means that the offer price is determined below the midpoint of the price range. The average $overhang$ is 3.07. 119 IPO firms are backed by venture capital. The average $perds$ is 47 days, and the average age of a firm is approximately 10 years. The average of RV is approximately 0.9035. Panel B presents the Spearman Correlation Coefficients among the variables. $Mark$ and RV evidence a statistically significant relationship, but no correlation with any other variables. The variable adj appears to have a significant correlation with $Mark$, $profit$, and $\ln(procds)$. The variable $\ln(procds)$ evidences a relationship with many variables, including $Mark$, adj, $perds$, $\ln(asset)$, age, and $profit$. These variables, which evidence a relatively high correlation, are not used together in the regression model to avoid multi-collinearity problems.

Table 3
The summary statistics

This table presents summary statistics of 187 IPOs satisfying our sample selection criteria since 2002.9 to 2005.12. Panel A shows descriptive statistics of variables used in the analysis, and Panel B describes Spearman Correlation Coefficients among those variables.

Panel A. Descriptive statistics

	N	Min.	Max.	average	Std.
RV(ratio)	187	.13	8.35	.9035	0.88601
IR(%)	187	-90	133	54.25	0.46755
mark(%)	187	-1.12	0.68	0.0453	0.30442
adj(%)	187	-54	100	-6.38	0.16378
overhang(ratio)	187	0.19	10.00	3.0749	1.38143
VC	187	.00	1.00	.6364	.48234
perds(day)	187	34	158	47.3048	14.02410
ln(asset)	186	15.36	19.65	16.8594	.62812
age(year)	187	2	35	10.3957	7.02710

| profit(%) | 187 | 4.00 | 62.00 | 18.0107 | 10.49065 |
| ln(procds) | 187 | 22.17 | 27.25 | 24.1145 | 0.88032 |

Table 3-continued

Panel B. Spearman Correlation Coefficients among variables (continued)

	mark	adj	over hang	VC	periods	ln (asset)	age	profit	ln (procds)	RV
mark	1	0.319**	0.027	-0.023	-0.115	0.016	-0.084	0.141	0.169*	-0.035
adj		1	0.074	0.117	-0.0187*	0.102	-0.029	0.227**	0.353**	0.076
overhang			1	0.292**	-0.101	-0.105	-0.295**	0.015	-0.019	0.012
VC				1	-0.163*	0.082	-0.371**	0.043	0.106	-0.069
periods					1	-0.041	0.112	-0.016	-0.166*	-0.058
ln(asset)						1	0.147	-0.131	0.551**	0.062
age							1	-0.241**	-0.184*	0.052
profit								1	0.389**	-0.080
ln(procds)									1	0.345**
RV										1

RV is defined as the ratio of $(P/EBITDA)_{IPO}$ over $(P/EBITDA)_{matchingcompany}$. IR is measured as the market-adjusted initial return on the offering day. $mark$ is defined as the return of the industry index where the IPO company belonged in the three months preceding the offering date. adj is measured as the adjustment rate of the final offer price relative to the midpoint of the initial file price range. $overhang$ is defined as the ratio of the pre-IPO equity stake over the selling stock in the IPO. VC is a dummy variable, set to 1 if the offering firm is venture capital backed and 0 if otherwise. $perds$ is the period from the date of prospectus filing to the offering date. $\ln(asset)$ is the natural logarithms of asset. age is the age of the offering firm. Profit is the EBITDA marginal rate, (EBITDA/Sales)×100. $\ln(procds)$ is the natural logarithms of total amount of IPO proceeds. We denote significance at 1%, 5%, and 10% level by ***, **, * respectively.

Table 4 shows the number of IPO firms for each industry by the market condition. Overall, IPOs are concentrated in high-tech industries such as IT equipment/Internet, equipments/devices, computer-hardware and communications equipment. Particularly, most IPOs in the IT equipment/Internet industry take advantage of hot market conditions to go public. IT industry and its related industry in Korea have been developed rapidly since 1999. So many IT firms grew up and went public in the hot market. In contrast, IPOs in the

software and navigation equipment/transport usually went public in the cold market conditions. In the other industries, there is no difference between hot and cold market conditions.

Table 4
The number of IPO firms by industry and market conditions

This table presents the number of IPO firms for each industry by the market condition. Other industries in the industry category include metal, broadcasting, and nonmetal.

	Total IPOs	IPOs in hot market condition	IPOs in cold market condition
IT equipment/Internet	42	20	6
equipments/devices	23	7	7
computer hardware	19	7	6
communications equipment	18	6	8
computer service	10	5	1
chemistry	10	4	3
software	9	2	6
information technology	7	4	1
navigation equipment/transport	7	1	5
medical instruments	10	3	5
metal	4	1	2
clothing/clothes	4	-	4
electricity/electronics	4	1	1
publishing	3	1	2
beverages	2	-	1
paper/pulp	2	-	1
other industries	13	4	7
Total	187	66	65

3.2 Financial characteristics

Table 5 compares the IPO firms and their matching firms with regard to financial characteristics. The medians of the IPO firms' offer price and matching firms' stock price are ₩4000 and ₩3,908, respectively. The medians of the net sales, EBITDA, and net income for the IPO firms are 7.1, 3.8, and 3.4 million Won, respectively, and those for the matching firms are 9.4, 4.7, and 4.2 million Won,

respectively. They evidence a similar pattern.

Table 5
Financial characteristics of Offering firms and Matching firms

This table compares IPO firms and their matching firms in terms of financial characteristics.

	IPO firms				Matching firms in the prospectus			
	mean	25%	50%	75%	mean	25%	50%	75%
Net sales (million Won)	9.7	4.9	**7.1**	11.70	16.1	5.2	**9.4**	16.2
EBITDA (million Won)	5.7	2.6	**3.8**	6.80	8.4	2.1	**4.7**	8.6
Earnings (million Won)	5.2	2.1	**3.4**	6.60	8.1	1.9	**4.2**	8.2
Offer price (Won)	6,487	2,500	**4,000**	8,000	8,959*	1,885*	**3,980 ***	9,300*

The sign, *, means the stock price on the previous date of the offering

3.3 The analysis of relative valuation by the market condition

Table 6 shows the offer price multiples of IPO firms and the market price multiples of the matching firms by market conditions. In the case of EBITDA, the average value of the IPO firms' offer price and that of the matching firms computed via the price multiples method increased from 8666.56 and 11871 under cold market conditions to 8861.64 and 12551 under hot market conditions, respectively. This table demonstrates that the value of matching firms, as well as that of IPOs, is influenced by market conditions. Thus, we can assume that the price multiples of matching firms can be utilized as a proxy for the market value of the IPO firms.

Purnanandam and Swaminathan (2004) also assessed the IPO valuation via the price-multiple method in order to show that the IPO was overvalued. They considered the value of the matching firm selected by the industry-sales-EBITDA profit margin to be the intrinsic value of the offering firms. However, as shown above, the matching firms' value is influenced heavily by the prevailing market conditions. Thus, we argue that it is reasonable to assume that the market value of the matching firm as assessed by the price multiples method is the market valuation of the IPO firms, including the noise trader's expectations rather than simply the firms' intrinsic value.

Table 6
The offer price multiples of the IPO firms and market price multiples of the matching firms by the market condition

This table presents the offer price multiples of IPO firms and the market price multiples of the matching firms by market conditions. For example, the value of offer price and the value of matching firm by the EBITDA criteria is measured like this respectively:

$$\frac{P}{EBITDA}_{IPO} = \frac{\text{offer price} \times \text{total shares issued on the offering day}}{\text{prior fiscal EBITDA}}$$

$$\frac{P}{EBITDA}_{matching} = \frac{\text{market price} \times \text{total shares issued on the same day}}{\text{prior fiscal EBITDA}}$$

		The value of offer price			The value of matching firms'		
		Net sales criteria	EBITDA criteria	Earnings criteria	Net sales criteria	EBITDA criteria	Earnings criteria
Hot market	mean	4854	8861	11401	6166	12551	15477
	median	4037	7223	7756	5459	10271	12847
Cold market	mean	4838	8666	9660	4580	11871	14436
	median	3222	5639	7200	3515	7978	10465

Table 7 shows the relative valuation of the IPO firms' offer price over the market value of the matching firms by market condition and the types of price multiples. This result shows how much the offer price of the IPO firms reflects the market valuation under different market conditions. This result outlines several important implications. First, the offer price is generally undervalued relative to the matching firms. The median RV ratios, based on net sales, EBITDA, and net earnings criteria for the entire sample, are approximately 0.84, 0.73, and 0.76, respectively. The table provides the p-value from the *Wilcoxon Rank Sum Test* in order to determine whether the median RV is equal to 1. Among these ratios, the RV ratios, based on the EBITDA and net earnings, are significantly below 1. Second, the RV ratios under hot market conditions are lower than those measured under cold market conditions. The average, 25th, 50th, and 75th percentiles of RV ratios under hot market conditions (median: 0.74, 0.66, and 0.66, respectively), are lower than those observed under cold market conditions (median: 0.89, 0.77, and 0.77, respectively). In addition, the average of the RV ratios in the cold market is approximately 1 or above, but in the hot market those values ranged between 0.84~0.90.

We may, therefore, come to the conclusion that issuers and underwriters reflect the market value to the offer price differently depending on the prevailing market conditions. Given that the value of matching firms show the market expectation regarding the IPO firms, the underwriters and issuers fully reflect the market expectation to the offer price in the cold market, whereas only partially in the hot market in our study. This result supports our hypothesis 1, as previously stated.

Table 7
The relative valuation of IPOs over matching firms' value

This table shows the relative valuation of the IPO firms' offer price over the market value of matching firms by market condition and by the types of price multiples. This table shows how much the offer price of the IPO firms reflect the market valuation in different market conditions. For example, the relative valuation of IPOs over matching firms' value is measured like this;

$$(RV)_{EBITDA} = \frac{(P/EBITDA)_{IPO}}{(P/EBITDA)_{matching}}$$

	Total				
	mean	25%	50%	75%	p-value
Net sales criteria	1.07	0.59	0.84	1.2	0.8300
EBITDA criteria	0.90	0.52	0.73	1	0.0001***
Earnings criteria	0.94	0.46	0.76	1	0.0001***
	Hot market condition				
	mean	25%	50%	75%	p-value
Net sales criteria	0.86	0.51	0.74	1.04	0.0006***
EBITDA criteria	0.84	0.45	0.66	0.94	0.0001***
Earnings criteria	0.90	0.41	0.66	0.96	0.0006***
	Cold market condition				
	mean	25%	50%	75%	p-value
Net sales criteria	1.33	0.66	0.89	1.46	0.8615
EBITDA criteria	0.98	0.51	0.77	1.02	0.0002***
Earnings criteria	0.92	0.46	0.77	0.99	0.0001***

3.4 The analysis of firm characteristics by the market conditions

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Table 8 shows the characteristics of IPO firms by the market condition and RV criteria. The mean of RVs in hot and cold market conditions is 0.84 and 0.98 respectively. As shown in the table, the mean of RV in 'IPOs under hot market conditions' is lower than that in 'IPOs under cold market conditions.' In addition, 56% of tech firms go public in the hot market conditions, and they under-value their IPOs particularly. It's interesting that younger firms prefer to go public in the hot market condition. Loughran and Ritter(1995) assert that venture capitalists consider hot market as the opportunity to earn more money by going public the firms which they have invested. However, there are no differences of VC and VC rate in both market conditions. So we can not find any evidence to support their argument.

Table 8 also demonstrates the performance of IPOs in the long-run. We calculate the long-run performance as the cumulative abnormal returns. IPOs in hot and under-valued sector show the highest initial returns but their long-run performance during 18 months is -0.22, which is very low compared to that of IPOs in hot and over-valued sector, 0.02. Thus, we can infer that IPO firms take advantage of market condition according to 'windows of opportunity' hypothesis (Lerner, 1994; Loughran and Ritter, 2000; Ljungqvist et al., 2006)

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Table 8
Firm characteristics of IPOs by market conditions

This table shows the **characteristics of IPO firms** by the market condition and RV criteria.

	IPOs under hot market conditions			IPOs under cold market conditions		
	total	RV>1	RV<1	total	RV>1	RV<1
N	66	16	50	65	17	48
RV	0.84	1.19	0.58	0.98	1.47	0.63
Tech	0.56	0.44	0.6	0.29	0.31	0.24
own	55.91	50.5	62	55.89	55	50.5
overhang	3.20	3.5	3.1	3.08	3.18	3.04
periods	44.52	42.94	45.02	49.06	47.18	49.73
age	9.65	7.81	10.24	11.63	13.41	11.00
age 6	0.44	0.63	0.38	0.35	0.24	0.40
VC ratio	9.48	7.38	10.16	9.92	9.88	9.94
VC	0.61	0.60	0.63	0.62	0.65	0.60
adj	0.00	0.08	-0.02	-0.11	-0.06	-0.13
IR	0.81	0.76	0.95	0.41	0.41	0.42
CAR6	-0.18	-0.34	-0.13	-0.07	-0.22	-0.02
CAR18	-0.18	0.02	-0.22	-0.10	-0.37	-0.01

N is the number of IPO firms. RV is defined as the ratio of $(P/EBITDA)_{IPO}$ over $(P/EBITDA)_{matchingcompany}$. Tech is a dummy variable, set to 1 if IPOs are in high-tech industry. Own is the ratio of ownership. $overhang$ is defined as the ratio of the pre-IPO equity stake over the selling stock in the IPO. Periods is the period it takes for offering firms to go public. age is the age of the offering firm. age 6 is a dummy variable, set to 1 if IPOs under the age of 6. VC ratio is the holdings of venture capital. VC is a dummy variable, set to 1 if the offering firm is venture capital backed and 0 if otherwise. adj is measured as the adjustment rate of the final offer price relative to the midpoint of the initial file price range. IR is measured as the market-adjusted initial return on the offering day. CAR6 is the mean of cumulative abnormal returns during 6 months. CAR18 is the mean of cumulative abnormal returns during 18 months.

3.5 The results of logistic regression

Table 9 shows the results of logistic regression in order to determine whether market conditions harbor deterministic power over the low/high of the relative valuation of the IPO firms controlling for other variables.Table 9 demonstrates that the market condition, $mark$, has a significantly negative deterministic power over the extent of RV. This means that the relative valuation of the offer price over its matching firms is lowered when market conditions become bullish. This result is consistent with the results reported by Ljungqvist *et al.* (2003), Bouis (2003), Edelen and Kadlec (2005), and Derrin (2005), in that the offering stock is undervalued relative to the market value. This is also consistent with the results reported by Edelen and Kadlec (2005), who demonstrated that issuers adjust their offer price by approximately 1.9% relatively in response to 4.5% changes in market valuations during the waiting period. This data supports our hypothesis 1 more robustly.

The variable adj evidences a significantly positive sign. This means that the market value is more faithfully reflected as the offer price is revised upward. The variable $profit$ (EBITDA profit margin) evidences a significantly negative sign, which differs from our expectations. As IPO firms evidence higher profitability, their relative valuation of the offer prices is lowered.The variable VC displays a negative sign. This is consistent with Prospect Theory as suggested by Loughran and Ritter (2002). Given that venture capitalists are regarded as pre-shareholders, they accept the undervalued offer price so as to maximize their expected surplus from the capital gains. In addition, this result is consistent with the results reported by Ljungqvist and Wilhelm (2003) and Bradly and Jordan (2002), whose studies indicated that IPOs backed by venture capital tend to be more undervalued. On the other hand, this result differs from the implication of the Certification Hypothesis by Megginson and Weiss (1991) and Gulati and Higgins (2003). They argue that since the ownership of the venture capitals certifies the firms and reduces the uncertainty of the firm, the size of the underpricing is reduced.

Table 9
The results of logistic regression

This table presents the result of the logistic regression.

$$RV = a + b \cdot Mark + c \cdot adj + d \cdot overhang + e \cdot VC + f \cdot perds + g \cdot \ln(asset)$$
$$+ h \cdot age + i \cdot profit$$

Independent variable	COFFICIENT	p-value
intercept	-0.845	0.880
mark	-1.708	0.042**
adj	6.714	0.001***
overhang	-0.003	0.994
VC	-0.719	0.173
periods	-0.006	0.794
ln(asset)	0.172	0.585
age	-0.033	0.300
profit	-0.032	0.064*
Model		18.661**
obs		125

The dependent variable RV is the relative valuation of offer price over matching firms. The independent variables are the following. $mark$ is defined as the return of the industry index where the IPO company belonged in the three months preceding the offering date. adj is measured as the adjustment rate of the final offer price relative to the midpoint of the initial file price range. $overhang$ is defined as the ratio of the pre-IPO equity stake over the selling stock in the IPO. VC is a dummy variable, set to 1 if the offering firm is venture capital backed and 0 if otherwise. $perds$ is the period from the date of prospectus filing to the offering date. age is the age of the offering firm. Profit is the EBITDA marginal rate, (EBITDA/Sales)×100. $\ln(procds)$ is the natural logarithms of total amount of IPO proceeds. We denote significance at 1%, 5%, and 10% level by ***, **, * respectively.

3.6 The analysis of offering periods by the market condition

Loughran and Ritter (2002), and Daniel (2002) previously asserted that issuers allow the IPOs to be undervalued in order to go public sooner, because they want to take advantage of many noise traders' high expectations under hot

market conditions. Thus, we can infer that the periods required for IPO firms to go public under hot market conditions are significantly shorter than under cold market conditions. Table 10 shows the time required for IPO firms to go public under different market conditions. As can be seen in this table, the median value under hot market conditions is 44 days, and under cold market conditions, 49 days. In addition, the difference is very statistically significant, as measured by the *Wilcoxon p-value*. This result supports our hypothesis 3, as stated previously.

Table 10
The analysis of offering periods by the market condition

This table compares IPO firms and their matching firms in terms of the period it takes for offering firms to go public.

	total market	hot market condition	cold market condition	wilcoxon p-value
periods(median)	47 days	44 days	49 days	0.0000***

We denote significance at 1%, 5%, and 10% level by ***, **, * respectively.

3.7 The results of multiple regressions

Thus far, we have determined that the relative valuation of the offer price is lowered under hot market conditions. Then, this less reflected portion in the relative valuation of the offer price is realized as the initial return. In order to assess the second hypothesis, that the initial return is negatively related with the relative valuation and is related positively to the market conditions, we studied the regression of the initial returns of the IPO firms with different market conditions, the relative valuation, and the other independent variables. The results of the regression are shown in Table 11.

In all of the regression models - model 1, model 2, and model 3 - the coefficients of the variables, *mark* and *adj*, are significantly positive, which is consistent with the findings of Loughran and Ritter (2002) and Choi (2005). What is most important in this study is that we supplement the empirical findings of the previous studies by demonstrating that the undervalued portion measured by the relative valuation of the offer price is realized as the initial return of the IPOs. The variable RV significantly influences the initial return in a negative way. Namely, the more undervalued IPO evidences a higher initial return. These findings have an important implication in that this study supplemented prior research regarding the behavior of IR on the offering day (Ljungqvist *et al*, 2003; Bouis, 2003; Edelen and Kadlec, 2005; Derrin, 2005) by showing that the RV has an additional explanatory power over the initial return after controlling for the market condition and adjustment rate. This study is the first, to the best of our knowledge, that attempts to evaluate the hypothesis via the Relative Valuation Method. Its results are very supportive of and consistent with the prior arguments, while simultaneously supporting our hypothesis 2.

The other control variable, *overhang*, exerts a positive effect on the initial return. It is consistent with the results of Loughran and Ritter (2002), and Bradley and Jordan (2002), who suggest that pre-shareholders are concerned not only with the offer price, but also with the capital gain. The variable VC has a negative effect on the initial return, but this is insignificant. The variable *perds* is significantly negatively related to the initial return. It implies that as the period to go public is attenuated, the offer price becomes increasingly undervalued, thus resulting in a higher initial return. Loughran and Ritter (2002), and Daniel (2002) have asserted that issuers allow the IPOs to be undervalued in order to go public sooner, because they wish to take advantage of many noise traders' high expectations under hot market conditions. Our results are very consistent with their assertion and also with our hypothesis 3. In an effort to prevent the multi-collinearity problem, we have assessed the effects of RV on the initial return via a variety of regression models. In all of the models, as had been expected, the variable RV has a very significantly negative effect on the initial return. In addition, the variables *adj* and *Mark* also have explanatory power, and this result is consistent with the findings of prior studies.

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Table 11
The results of regression analysis on the partial adjustment to public information

This table presents the result of regression analysis.

$$IR = a + b \cdot Mark + c \cdot RV + d \cdot adj + e \cdot overhang + f \cdot VC + g \cdot perds + h \cdot age + i \cdot profit + \ln(procds)$$

Independent variable	Model 1	Model 2	Model 3	Model 4	Model 5
intercept	1.68	0.503**	0.398**	0.407**	0.577***
	(1.589)	(2.893)	(2.303)	(2.278)	(3.270)
mark	0.220***	0.213***	0.223***	0.296***	
	(3.204)	(3.114)	(3.197)	(4.391)	
RV	-0.144***	-0.178***		-0.155**	-0.188***
	(-2.008)	(-2.751)		(-2.329)	(-2.841)
adj	0.288***	0.269***	0.249***		0.335***
	(3.970)	(3.811)	(3.473)		(4.841)
overhang	0.237***	0.250***	0.243***	0.261***	0.251***
	(3.392)	(3.612)	(3.446)	(3.661)	(3.548)
VC	-0.011	-0.027	-0.020	-0.002	-0.053
	(-0.149)	(-0.358)	(-0.263)	(-0.025)	(-0.706)
perds	-0.118*	-0.110	-0.103	-0.152**	-0.124*
	(-1.764)	(-1.657)	(-1.517)	(-2.246)	(-1.822)
age	0.061	0.066	0.058	0.114	0.041
	(0.822)	(0.888)	(0.774)	(1.499)	(0.539)
profit	0.082	0.053	0.067	0.104	0.067
	(1.126)	(0.776)	(0.962)	(1.500)	(0.958)
ln(procds)	-0.093				
	(-1.129)				
F-value	7.776	8.576	8.408	7.373	8.021
Adj R-sq	0.249	0.248	0.220	0.194	0.211
OBS	187				

The dependent variable IR is the industry-adjusted initial rate. The independent variables are the following. $mark$ is defined as the return of the industry index where the IPO company belonged in the three months preceding the offering date. RV is the relative valuation of offer price over matching firms. adj is measured as the adjustment rate of the final offer price relative to the midpoint of the initial file price range. $overhang$ is defined as the ratio of the pre-IPO equity stake over the selling stock in the IPO. VC is a dummy variable, set to 1 if the offering firm is venture capital backed and 0 if otherwise. $perds$ is the period from the date of prospectus filing to the offering date. age is the age of the offering firm. Profit is the EBITDA marginal rate, (EBITDA/Sales)×100. $\ln(procds)$ is the natural logarithms of total amount of IPO proceeds. We denote significance at 1%, 5%, and 10% level by ***, **, * respectively.

4. Conclusion

In recent years, it has been shown that the pricing mechanism of IPOs differs according to the prevailing market conditions. The results of previous research have demonstrated that the market valuation of IPO firms is reflected partially in the offer price under hot market conditions, in which there are many overly-optimistic investors. Thus, it evidences a high initial return despite the upward adjustment in the book-building period. In this paper, we have investigated the valuation of IPOs over market value under hot market conditions versus cold market conditions, and the resultant effects on initial returns.

Under the assumption that the market value of the matching firms shown in the prospectus is that of the IPO firms, we have computed the relative valuation (RV) of the offer price over the market valuation. We then compared the RV under hot and cold market conditions, and have attempted to determine whether the market conditions have deterministic power to the extent of the RV. In addition, we have attempted to determine whether a negative relationship exists between the RV and the initial return on the first day of trading. Finally, we attempted to determine whether underwriters or issuers are to take advantage of 'hot market conditions' by comparing the periods required for the issuing firms to go public from the day on which the preliminary prospectus was filed to the offering day under different market conditions.

Our study analyzed over 187 IPO firms in the Korean market from September, 2002 to December 2005. Since July 2002, Korean firms have announced the matching firms in the prospectus, which have to belong to the same line of business, as well as the same industry, and also need to have similar firm sizes and financial characteristics, and show a similar type of audit reports. Thus, the price multiples of the matching firms can be employed as the market valuation of the IPO firms.   We determined that the average values of the IPO firms' offer price and matching firms' stock price computed via the price multiples method increase from 8666.56 and 11871 under cold market conditions to 8861.64 and 12551 under hot market conditions, respectively. This result indicates that the value of the matching firm can be employed as the market valuation of the offering firms.

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In addition, the average value of the RV under hot market conditions is significantly lower than 1, but under cold market conditions, it is almost 1. The median of RV, in a hot market, is lower than that in a cold market. The result of logistic regression indicates that there is a significantly negative relationship between the market condition and the relative valuation. This implies that the market value is reflected partially in the offer price under hot market conditions. We also determined that the RV is related negatively with the initial returns in the regression. This result indicates that the amount of market value, which is not fully reflected in the offer price, eventually significantly affects the initial returns.

Finally, we determined that a much shorter time is required for IPO firms to go public under hot market conditions (44 days vs. 49 days respectively). This implies that underwriters or issuers wish to take advantage of market conditions by going public sooner. This study is the first, to the best of our knowledge, to demonstrate empirical evidence supporting different pricing mechanisms in accordance with market conditions, via the relative valuation method. In addition, we have supplemented the previous empirical research which has explored it using only the adjustment rate. Additionally, the results of this study provide an opportunity to directly explore the issuer's and underwriter's intentions, using the matching firms in the prospectus, as to how they determined the offer price under different market conditions.

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