Investor Interest, Under-Pricing and Trading Volume in Pakistan Secondary Market

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Abstract

This paper investigates the relationship between pre- and post-initial public offering (IPO) investor interest and under-pricing. The IPO investor interest influences the offering price of IPOs and divergence of opinions influence the trading volume of new IPOs. The study is based on secondary data collected from Karachi Stock Exchange (KSE) website and prospectus of companies which were going to be public during the study. Data were collected for the 59 companies which have been listed on KSE during January 2000–July 2010. Regression analysis and test of significance were conducted to examine the level of under-pricing and investor interest relationship. The average under-pricing of the Pakistan's IPOs is found to be 39%. Initial return is found to be positively related to the investor interest in Pre-IPO demand to offer ratio. The over-subscribed IPOs earn significant and high initial abnormal returns to investors. The under-priced IPOs have constantly high-trading volume than over-priced IPOs in the first 30 days of IPO listing. The additional control variables which influence the level of under-pricing in Pakistan include offer size, *ex ante* uncertainty, firm size and float, whereas float was found to be the single most important variable in determining the under-pricing.

Keywords: Initial public offering; Karachi Stock Exchange; Under-pricing; Investor interest; Float.

1. Introduction

Initial public offering (IPO) of common stocks on average earns abnormally high initial returns. This under-pricing takes place across different times and in different markets [1]. In developing markets, IPOs show average initial return of 14–388%, while the initial excess return on IPOs of developed markets ranged from 4% to 54% [2]. Investor interest prior to the IPO has influenced in directing the pricing of new issues, hence resulted in IPOs initial return and initial trading volume [3]. Initial under-pricing is positively related to the share demand-to-offer ratio in the pre-market and high investor interest leads to high initial return; it will increase the publicity and hence will increase the trading volume in the aftermarket [4]. Level of investor interest shows a positive influence on initial return and aftermarket short-term trading volume. Sohail and Raheman [5] while examining the under-pricing, identify *ex ante* uncertainty, offer size, firm size and over-subscription rate as important determinants of under-pricing.

Theories based on asymmetric information suggest that the value of newly established firms is more uncertain. In the presence of asymmetric information, the stimulation of investor interest is a critical issue in the success of IPOs. High-quality issuers signal their quality by issuing shares on low prices to attract investors for more funding [6]. In order to attract uninformed investors to participate in the IPO market firms thus have to accept under-pricing. As a result, the IPOs with greater level of investor interest tend to be under-priced. Trading volume reflects differences in the level of expectation among investors [7]. Agarwal *et al.* [8] found that the level of investor interest at the time of issuance is related to the after-market performance of IPOs and reflected in short-run and long-run trading volume of IPOs. A strong level of investor interest during the pre-market thus appears to lead to both a positive initial return and a high level of trading volume [8]. As the under-priced IPOs are subject to greater uncertainty, create divergence of opinion in the investors and reflect high trading volume [9]. The Pakistan secondary market is inefficient in information disclosure which leads to high level of uncertainty in the secondary market. Qurat-ul-ain [10] conducted the relevant conceptual testing on the Karachi Stock Exchange (KSE) in the

context of efficient market hypotheses (EMH) to check weekday effect, weekend effect, and January effect and religious holidays effect, by taking original data of closing prices. The results provide evidence that series of market prices do not follow random-walk model which seeks evidence of Weak Semi-strong form of efficiency of KSE 100 index from December 31, 2003-to March 4, 2010. Presence of some form of inefficiency in KSE, influenced by sentiments of speculation and insider trading is a typical phenomenon for emerging markets like KSE and leads to price volatility and manipulation [11]. The uncertainty about the recently established firms in Pakistan is high and leads to high initial return [5]. Mauer and Senbet [12] provide a theoretical as well as empirical argument regarding the role of the secondary market in the pricing of IPOs. They argue that the IPO under-pricing is a function of incomplete spanning in the secondary market and limited access by investors to private information. Haider and Nishat [11] point out that in KSE, the non-public information and insider information play their role, while the public information is not available. Corporate owner ship is very concentrated in Pakistan. The pyramid structure, cross-holdings and Family-dominated boards are less able to protect minority shareholder's rights and risk a loss of competitiveness [13]. Pyramid ownership structures make it possible to control some firms even with a very small share of their total capital. The majority shareholders are drivers of the stock market. They hold 80% of information and the small investors have only 20% of information [13]. The purpose of this paper is to explore how the interest of small investors can be developed through initial under-pricing and how these differently informed investors influence the trading volume of new stocks. This paper supports the literature by providing evidence on the presence of under-pricing in Pakistan secondary market and also contributes to the literature by exploring the extent by which pre-IPO investor interest effects the under-pricing and how this investor interest further influences the future trading volume of new stocks in the KSE.

2. Literature Review

The IPO process facilitates risk-sharing among the investors and capital formation by firms by allowing the initial owners of a firm to raise capital by transferring and sharing some of the firm's risk with the wider investing public. An IPO is defined as "the original sale of a company's securities to the wider public for the first time in the primary market" [14]. The IPO of common stocks on average earn abnormally high initial returns when returns are measured from the offer price to the closing price at the end of the first trading day [1, 2, 9, 10, 12–19, 20–28]. The issues that show positive return in the aftermarket or issues that show initial appreciation to the investor rather than to the issuer of the IPO are said to be "under-priced". Larry [23] defined under-pricing of IPOs as the premium that subscribing investors received at the initial stage of market trading, being the difference between subscription price and the first-day closing price. Ritter and Welch [3] point out that on IPO pricing and the first-day return (under-pricing) is first documented in the studies of Stoll and Curley [29], Logue [24], and Ibboston [15].

Ljungqvist [21] grouped the theoretical models which explain the IPO under-pricing under three different headings. The Asymmetry Information Models assume that there is difference of information between investors, the issuers and the underwriter. The institutional theories described on the basis of three features of market place: litigation, banks' price stabilizing activities once trading starts, and taxes. The control theories explain that under-pricing support the shareholders by reducing the intervention of outside shareholders while the company is public.

In all of the IPO markets around the world, under-pricing generally occurs, and it is considered as compulsory cost to the issuer [14]. Studies indicated that under-pricing occurs across a number of different times and samples of different markets [25]. It was found to be 11.4% initial return on New York Stock Exchange [15]; 9–11.5% of initial return in the first 10 days of trading for Canadian IPO [19]; the levels of under-pricing or initial return of 116.01% [17], 285.21% [30] and 87.18% [16] occurs in Dhaka Stock Exchange; the average initial returns of 1124 Chinese IPOs as 267% [31]; and average under-pricing of 35.6% in the KSE [5].

Key trends in the level of under-pricing can be determined by offer size, size of the company and industry type [16]. Chowdhry and Sherman [32] suggest that high-demand IPOs experience a relatively large positive return on the first post-IPO trading day. The pre-IPO investor demand influences the after-market performance of IPOs by influencing the first trading day returns and over-subscription ratio is used as indicator to describe the investor demand in pre-IPO market [8]. Miller and Reily [26] divide the whole sample into two groups as under-priced and over-priced IPOs and conclude that as the uncertainty is high for under-priced IPOs, the trading volume should also

be high for under-priced IPOs. The level of trading volume presents the disagreement about the value of the stock within investors. Reese [7] uses trading volume as an indicator of divergence of opinion of investors to predict their interest level in a particular stock after the listing started by calculating daily trading volume of each stock by the number of shares issued, and found a strong correlation between initial return and the initial trading volume. A positive relationship between trading volume and under-pricing is determined on the basis of the concept that the more differently informed investors causing a high-trading volume in the aftermarket, while using trading volume as a proxy for investor interest in the aftermarket [4].

Investors are uncertain about the value of newly established firms' IPO as compared with the well-known firms, and under-pricing can be interpreted as a premium for this uncertainty where *ex ante* uncertainty defined on the basis of asymmetric information [1, 28, 34, 35, 37]. There is significantly higher uncertainty for the under-priced IPOs. The most important finding of Miller and Reilly [26] is that under-priced IPOs that are subject to more uncertainty create divergence of opinion in the investor and reflect high-trading volume for under-priced IPOs. Reilly [2] indicated that following a rising market, IPO issues experience higher under-pricing than IPO following a falling market. The under-pricing is positively related to the market return while employing market volatility and market return as a control variable for market momentum [4]. According to Kucukocaoglu [20], the market return variable has a significant impact on the under-pricing of the issues and market volatility does not show significant impact on under-pricing. In Pakistan IPO market, the market volatility prior to the IPO has significant impact on the under-pricing of IPOs [5].

Researchers computed offer size variable as Log of offer size identifies a negative and highly significant relationship between Log of offer size variable and the level of under-pricing [2, 3, 5, 7, 10, 11, 27, 28, 34–35]. Studies suggest that float is positively related to the under-pricing [1–5, 7, 9, 10–19, 20–28, 30, 32–38]. A low percentage of offered shares should also indicate a greater relative insider ownership and reduce the initial under-pricing [22]. In the presence of symmetric information, the Signaling Models propose that high-quality firms signal their quality at the cost of under-pricing which is recouped in a seasoned offering [39]. Agarwal *et al*. [8] and Sohail and Raheman [5] used firm-size as measured by market capitalization and as an important predictor of under-pricing.

Sohail and Raheman [5] found that *ex ante* uncertainty, offer size, market capitalization and over-subscription variables showed greater effect while the percentage of shares offered has modest power in explaining the under-pricing in Pakistan secondary market. The relationship of under-pricing and after-market investor interest has not been explored in Pakistan secondary market. While Reese [7] and Chahine [4] suggest that investor interest is an important predictor of under-pricing and under-pricing is positively related to investor interest and trading volume.

3. Objectives and Hypotheses

The objective of the study is to investigate the relationship between under-pricing and investor interest prior to and after the IPO date, in the Pakistan capital market. It is to assess the relationship between initial under-pricing and pre-IPO investor interest; and to evaluate the relationship between initial under-pricing and trading volume in the aftermarket. The level of investor shows a positive influence on initial return and aftermarket short-term trading volume [1–4, 7, 9–28, 32, 33, 36–38]. *Ex ante* uncertainty, offer size, firm size and over-subscription rate are identified as important determinants of under-pricing [5]. The hypotheses formulated for empirical testing are as follows:

1. Initial under-pricing is positively related to pre-IPO investor interest level.
2. Initial under-pricing is positively related to trading volume in the aftermarket.

4. Methods

The study is based on secondary data that is collected from online available web sites of KSE and from the prospectus of companies which are going to public during the study. The study examines 59 IPO from January 2000 to May 2010 and firm data and issue data from the KSE web site. Descriptive statistics, *t*-test and ordinary least

square regression is used to assess the relationship between under-pricing, pre-IPO investors' interest and trading volume in the aftermarket, while controlling the model for *ex ante* uncertainty, firm size, market volatility, offer size and float variables. Incremental regression is used as a robustness test in the study.

Initial under-pricing is calculated by the difference between the offer price and closing price in the aftermarket.

Indicator	Computed as
Initial raw return	$R_{i,1} = P_{i,1} - P_{i,0}/P_{i,0}$
Initial Market Adjusted Return	$MAAR_{i,1} = \{[(1 + R_{i,1})/(1 + R_{m,1})]-1\}$

Sohail and Raheman [5]; Agarwal *et al*. [8].

where $P_{i,1}$ is the price of stock *i* at the close of the first trading day, $P_{i,0}$ is the offer price and $R_{i,1}$ is the total first-day raw return on the stock *i*. $R_{m,1}$ is the first day's equivalent market return.

The investors' interest influence the initial return and create divergence of opinion in investors in the aftermarket, and influence the trading volume. So we use the demand to offer ratio and trading volume as main explanatory variables.

Indicator	Computed as
Subscription rate	No. of shares demanded/No. of shares issued
Trading volume	Daily turnover/No. of shares issued

Reese [7]; Chahine [4].

4.1. Control variables

Variable	Indicator	Computed as
Ex ante Uncertainty	Ex ante Uncertainty	SD of daily stock returns after trading starts
Float	Float	Shares offered as a percentage of total authorized shares
Offer size	Offer size	Offer shares multiply by offer price
Market volatility	Market volatility	SD of daily market return over the two months before the closing date of subscription.
Firm size	Market capitalization	MC at the 10th day of trading.

Sohail and Raheman [5].

5. Results and Discussion

Table 1 displays the descriptive statistics of the sample used in the analysis of under-pricing of IPOs of equity. These IPOs were issued between January 1, 2000 and May 31, 2010. The sample consists of 59 companies who issue their stock in the primary market for the first time.

The average number of shares offered by 59 new firms remained at around 33.76 million. Offered shares ranges from 1 million to 215 million. The average offer price is Rs. 23.88. The offer price ranges from Rs. 10.00 to Rs. 235.00. Offered shares show average subscription rate of three times. The average subscription rate ranges from 0.01 to 18.67 times during 2000–2010.

Table 1: Descriptive statistics.

Variables	No. of IPOs	Mean	Median	SD	Min.	Max.
Shares offered (million)	59	33.76	22.50	40.85	1.00	215.04
Offer price (Rs.)	59	23.88	10.00	33.78	10.00	235.00
Subscription rate	59	3.05	1.24	3.73	0.01	18.67
Float	59	22.94	25.00	12.16	1.47	50.00
Ex ante uncertainty	59	2.47	0.76	5.80	0.12	39.04
Market volatility	59	426.94	357.99	313.03	43.07	1369.03
Trading volume	59	9.55	3.37	21.15	0.00	1.39
Firm size (million)	59	11691.12	1064.00	38410.00	62.40	219616.17
Offer size (million)	59	834.59	250.00	1560.88	10.00	8107.50

The descriptive statistics show that the mean float for 59 IPOs during 2000–2010 is 22.94%. The mean of daily stock returns (*ex ante* uncertainty) for the whole data set is 2.47 and mean for daily market return (market volatility) is 426.94. Mean trading volume of IPOs is 9.55. Mean firm size is 21.26 million and offer size is 19.64 million.

5.1. Analysis of daily initial returns

Daily initial return refers to the first 7 days initial return of stock after its trading start. Table 2 presents the mean initial return for the first seven trading days for the entire sample, for over-priced group of IPOs and for under-priced group of IPOs. Over-priced group includes IPOs that are experiencing negative raw returns on the first day of trading. Under-priced group includes IPOs experiencing positive returns on the first day. Market Adjusted Abnormal Return (MAAR) shows the initial market adjusted return of IPOs. The results reveal that 32% IPOs provide investors with initial negative return, which shows that these (19 IPOs) are over-priced whilst 67.8% IPOs are under-priced presenting that 40 IPOs provide investors with positive high-initial return. As can be seen, the average initial return of entire sample is 39.8%, which is consistent with the findings of previous studies conducted in KSE [5].

Table 2: Daily MAAR.

Days	MAAR of all IPOs (59)	MAAR of over-priced IPOs (19)	MAAR of under-priced IPOs (40)
Panel A: MAAR scaled by offer-price			
1	0.3987*	−0.0999*	0.6355*
2	0.3938*	−0.1501*	0.6521*
3	0.3920*	−0.1488*	0.6489*
4	0.3899*	−0.1442*	0.6435*
5	0.3823*	−0.1587*	0.6393*
6	0.3734*	−0.1768*	0.6348*
7	0.3600*	−0.1877*	0.6201*
Panel B: MAAR scaled by previous day closing-price			
1	0.3987*	−0.0999*	0.6355*
2	−0.0066	−0.0490	0.0135
3	−0.0002	0.0045	−0.0025
4	−0.0011	0.0037	−0.0033
5	−0.0037	−0.0122	0.0004
6	−0.0075	−0.0213	−0.0010
7	−0.0100	−0.0115	−0.0093

*Significant at 0.1; The t-test is calculated for daily abnormal return.

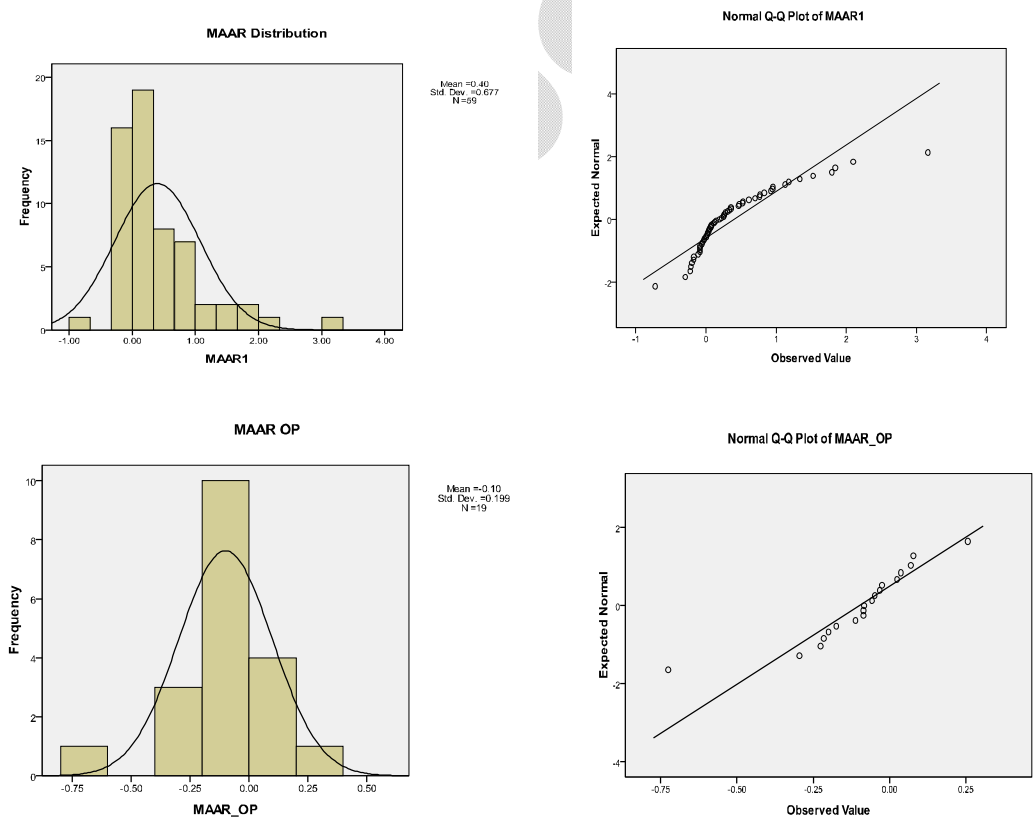
Panel A in Table 2 shows the MAAR scaled by offer-price of the stock at the subscription date. These results exhibit, on average, high-initial abnormal returns during the first 7 days of trading for stocks subscribed from the primary market. Panel B in Table 2 shows the MAAR of stocks scaled on the previous day closing price. Result of entire sample shows that only the first-day MAAR, i.e. 39.8% is significantly different from zero at the 1% level. It can be concluded that with confidence level of 99%, if investors subscribe for shares in the new issues at offer price, they would make an average profit of 39.8% in the KSE on the day of first trading. The data reveal that there is positive high-initial return for under-priced IPOs at the first-trading day of 63.5%, with no significant returns occurring on any of the subsequent days.

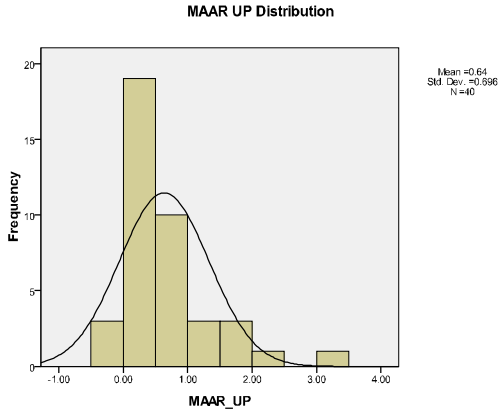
5.2. MAAR Normality Analysis

Figure 1 shows the MAAR histograms and normal *Q–Q* plot for the entire sample, as well as both offer-priced and under-priced IPO groups. Histograms are recommended for inspecting the shape of the distribution [40] and normal is used to describe a symmetrical, bell-shaped curve, which has the greatest frequency of scores in the middle, with smaller frequencies towards the extremes [38]. The shape of the distribution for each group can be seen in the histogram provided.

For both groups, MAAR appears to be reasonably normally distributed. This is also supported by an inspection of the normal probability plots (labeled as Normal *Q–Q* Plots). In these plots, the observed value of return for all the companies is plotted against the expected value from the normal distribution. A reasonably straight line suggests a normal distribution of return.

Figure 1: Distribution of the MAAR for all, under-price and over-price IPOs.





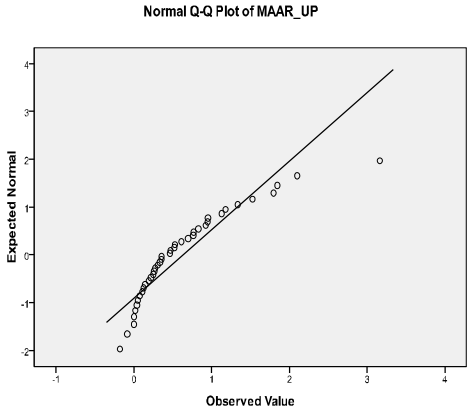


Table 3: Normality test.

	Kolmogorov-Smirnov		
	Statistic	**df**	**Sig.**
MAAR	0.186	59	0.000
MAAR_OP	0.161	19	0.200
MAAR_UP	0.162	40	0.010

Table 3 shows the p-value for a Kolmogorov–Smirnov test of composite normality that is 0.000 and 0.01 for entire sample and under-priced IPOs being significant and showing non-normal distribution of data [1–3, 7, 9–28, 30, 33, 34, 36–38] while the p-value of Kolmogorov–Smirnov for over-priced IPOs is 0.200 which shows a normal distribution of the data.

5.3. Trading volume and initial returns of IPOs

The comparison of daily trading volume (TV) of IPOs is presented in Table 4. Table 4 displays the pattern of daily trading volume activity in total sample, in over-priced IPOs and under-priced IPOs. The average first-day volume for the entire sample was 3,800,713 shares. This represented 11.26% of the average offering issue of 33,767,429 shares. The average volume was almost halved the second day, and by the 30th day was down to 1,236,886 shares, or 3.66% of the offering issue. A similar pattern was observed for the over-priced and under-priced groups.

Table 4: Trading volume comparison.

Mean offer size	**Total sample 33,767,429**		**Over-priced group 37606352**		**Under-priced group 31,943,940**	
Days	**Shares traded**	**% TV**	**Shares traded**	**% TV**	**Shares traded**	**% TV**
1	3,800,713	11.26	2194350.26	5.84	4,563,735	14.29*
2	1,774,437	5.25	692300.74	1.84	2,288,452	7.16***
3	2,294,01	6.79	307108.32	0.82	3,237,789	10.14***
4	1,950,36	5.78	661162.89	1.76	2,562,741	8.02
5	1,509,65	4.47	384641.37	1.02	2,044,034	6.39
6	1,370,35	4.06	322459.84	0.86	1,868,110	5.85
30	1,236,88	3.66	430136.42	1.144	1,620,092	5.07*

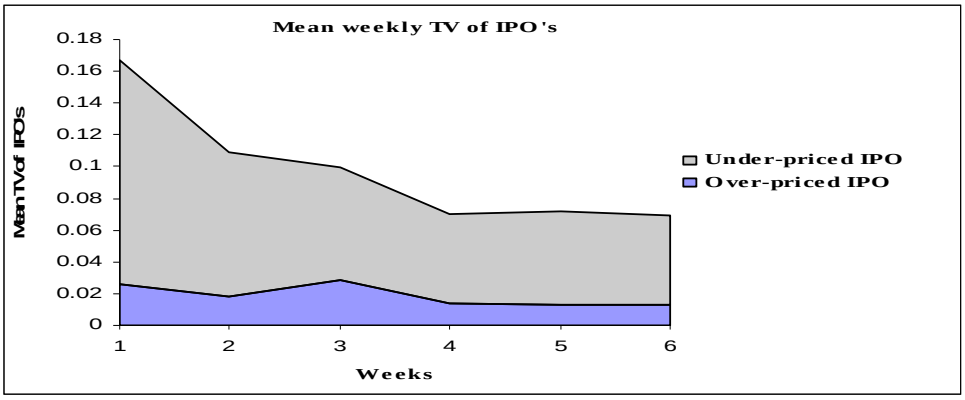
***, **, *: significant at 0.01, 0.05, 0.1 level.

The t-test is calculated for difference between under-priced and over-priced IPOs' daily trading t volume. Overall, the volume results indicated strong TV on day 1 when all the significant price changes occurred, which implies that volume and price movements (both under-priced and over-priced) were correlated. Table 4 also represents the t-test of the daily mean differences in TV between the under-priced and over-priced groups. The results indicate significantly higher level of trading for the under-priced group during days 1 through 30. On day 1 and 30, the difference was significant at a 0.1% level for under-priced IPOs as reported by Miller and Reilly [26]. The level of trading indicates the divergence of opinion among investors in the aftermarket [9]. Hence, the above analysis shows larger TV for the under-priced group and provides evidence that investors have heterogeneous and systematically different reactions on the IPO date. Large TV during the first day of trading further provides evidence of greater uncertainty for the under-priced group. Consistent with prior research, results of Reese [7] and Chahine [4] show a positive association between initial under-pricing and divergence of opinion among investors in the aftermarket. The more the issue is under-priced, the more it attracts differentially informed investors causing a high-trading volume in the aftermarket.

5.4. Comparison of trading volume and initial returns

Figure 2 shows graphical comparison of trading volume for the two groups of under-priced and over-priced IPOs. Mean weekly trading volume calculated for the first 6 weeks of trading. It is evident that the under-priced group has consistently more trading volume than the over-priced group as consistent with the results presented by Reese [7].

Figure 2: Mean weekly trading volume of IPOs.



5.5. Investors' interest and initial under-pricing

To examine the relation between IPO investor demand and initial under-pricing, initial raw return and first-day market adjusted return are calculated for under-subscribed IPOs and over-subscribed IPOs. First-day initial return is calculated as percentage change in the first-day trading price to offer price. The over-subscribed IPOs with subscription rate more than 1 shows high demand for IPOs. The under-subscribed IPOs are with subscription rate less than 1 represents low demand for IPOs.

Table 5: First-day returns and subscription.

Mean	All IPOs (59)	Under-subscribed IPOs (16)	Over-subscribed IPOs (43)
First-day raw return	0.4374*** (4.680)	0.1002 (1.000)	0.5769*** (4.824)
First-day MAAR	0.3987*** (4.524)	0.1667 (1.174)	0.4992*** (4.611)

Note: The first-day raw returns (offer-to-close) and MAAR for the IPO portfolios under subscribed and over-subscribed IPOs. The t-test for over-subscribed IPOs shows significant first-day raw return and MAAR.
***Significant at 1% level.

Table 5 displays the t-test results to explain the relationship between investor demand and initial return. The first-day raw return of entire IPO sample observes an average initial return of 43.74% during the study time period, suggesting substantial IPO under-pricing. The over-subscribed IPOs earn positive and highly significant initial returns of 57.69%. The market-adjusted initial returns for the low-demand IPOs earn insignificant and low initial MAAR of 16.67%, while the high-demand IPOs earn positive and significant MAAR of 49.92%. These preliminary statistics suggest a positive relation between investor demand and first-day returns. The significant difference in initial returns between the undersubscribed and oversubscribed IPO portfolios also suggest that investor demand may play a critical role in IPO pricing [8].

5.6. Regression analysis

Literature suggests that when R square is more than .90 the chance of multicolinearity exists [41]. There is no multicolinearity as coefficient of determination is 0.61. The test of Variance Inflation Factors (VIF) and tolerance for individual variables is also performing to assess this critical and important issue of multicolinearity. In case of VIF, if the result is below 10 and tolerance near to 0 suggest no multicolinearity [37]. As given in Table 6, VIF for the variables range from 1.08 to 9.01.

Table 6: Colinearity statistics.

Independent Variables	Tolerance	VIF
Subscription	0.692	1.445
Trading volume	0.919	1.088
Offer size	0.150	6.671
Market volatility	0.915	1.093
Float	0.247	4.042
Ex-ante uncertainty	0.763	1.311
MC-firm size	0.083	9.011

Tables 7 displays the results of ordinary least square regression of the Initial raw return on pre-IPO investors' interest and the first-day trading volume in the aftermarket. It includes the regression of the initial raw return on explanatory variables controlling for firm-specific characteristics such as the firm size (MC-Firm size), percentage offer size and float, and market specific characteristics as Market Volatility over the 2-month period prior to the IPO date and *ex ante* uncertainty in the aftermarket as standard deviation of 30-day stock return in the after-market trading. Consistent with the previous studies of the KSE, OLS regression model shows that initial under-pricing is positively related to firm size and float, *ex ante* uncertainty over the 1-month period after the trading and subscription ratio. The offer size is negatively related to initial returns.

Table 7: Regression result for all independent variables.

Independent variable	Beta	t-test	Sig.
Constant	–2.88	–2.216	0.031
Subscription	0.276	2.656***	0.011
Trading volume	0.029	0.317	0.753
Market volatility	0.066	0.734	0.466
Float	1.027	5.898***	0.000
Log – MC	1.628	5.425***	0.000
***Ex ante* uncertainty**	0.167	1.685*	0.098
Log–offer size	–1.165	–5.208***	0.000
R		0.786[a]	
R^2		0.617	
F-statistics	11.73943		0.000[a]

Notes: Predictors: (Constant), Log–offer size, Ex-uncertainty, Trading volume, Market volatility, Float, Subscription, Log–MC. Dependent variable: Raw-return.

[a]: significant at 1% level. ***, , *: Respectively significant at 0.01, , 0.1 level.

The coefficients of estimated equation are as follows:
Initial Raw return = 0.276 (subscription rate) + 0.029 (trading volume) + 1.628 (Log–MC) + 0.066 (market volatility) – 1.165 (Log – offer size) + 1.027(Float) + 167 (*ex ante* uncertainty)

In Table 7, R^2 indicates that 61% variations in under-pricing are associated with the variations in independent variables. Investors' interest appears to be a central issue allowing the success of an IPO. Investor interest in primary market pressurizes the share offer prices, hence the initial return of IPO (see also Reese [7]). Firms looking to attract investors have to accept under-pricing when going public. The most remarkable result is that the subscription ratio is a strong predictor of initial returns. On average, every unit increase in the subscription rate contributes to a 0.27% increase in initial returns. Consistent with the study of Chahine [4], Sohail and Raheman [5], the relationship between subscription rate and initial return is positive and significant at 1% level. In the regression analysis result, positive and significant relation of firm size (Log–MC) with initial return variable reflects that the larger firms can afford under-pricing [33]. The regression result shows a positive relation with under-pricing and *ex ante* uncertainty significant at 10% level. This result supports that there is significantly higher uncertainty for the under-priced IPOs [1, 2, 4, 9–12, 15–28, 30, 32, 33, 36–38, 42, 43].

Consistent with the studies of Corwin [43] and Sohail and Raheman [5], float is positively related to the under-pricing. Negative relation between offer size and initial return is found to be statistically significant at 1% level. On average stock with offer size <8 million shows initial return of 72% and as low as 35% for offer size more than 42 million. These results are consistent with the study of Ranjan and Madhusoodanan [35] and Sohail and Raheman [5].

5.7. Incremental regression

Incremental regression is used as a robustness test to further explore the more important variable in determining the value of dependent variable.

Table 8: Incremental regression.

MODEL	OLS 1	OLS 2	OLS 3	OLS 4	OLS 5	OLS 6	OLS 7
Constant	–2.783	–2.213	–2.339**	1.491	0.399	–2.327**	–1.549
Subscription	-------	2.675***	2.631***	3.518***	3.512***	3.608***	3.011***
Trading volume	0.263	-------	0.297	0.126	0.669	0.373	1.031
Market volatility	0.555	0.732	-------	0.896	0.409	0.648	–0.002
Float	6.568***	5.944***	5.991***	-------	1.991**	5.974***	2.661***
Log–MC	6.094***	5.528***	5.424***	.687	-------	5.519***	1.384
Ex uUncertainty	2.881***	1.713**	1.662	1.742*	1.788*	-------	1.663*
Log–offer size	–5.493***	–5.397***	–5.179***	–1.342	–0.605	–5.241***	-------
R	0.751a	0.785a	0.783a	0.597a	0.630a	0.772a	0.643a
R^2	0.565	0.617	0.613	0.357	0.397	0.596	.414
F	11.236	13.944	13.752	4.801	5.698	12.793	6.123
Sig.	0.000[a]	0.000[a]	0.000[a]	0.001[a]	0.000[a]	0.000[a]	0.000[a]

[a]: significant at 1% level.
***, **, *: Respectively significant at 0.01, 0.05, 0.1 level.

Incremental regression results show that by removing any variable from model the value of R^2 decreases, so all the variables included in regression model are very important. Float, firm size, and offer size are the most important factors in determining the value of under-pricing. Float is the most important variable in the model as it has altered the value of R^2 to a highest degree from 61% to 35%.

5.8. Year wise analysis of IPOs

Pakistan's stock market is smaller in size but is significantly more active than the markets of this size. Iqbal [18] specifies that with respect to size, Pakistan's stock market is still one of the smallest among some African and Latin American emerging markets.

Table 9: IPO's announced during 2000-2010.

Year of listing	No. of IPOs	No. of IPO's included in the study	Mean issued shares in millions	Mean offer price in Rs.
2000	3	2	18.25	10.75
2001	3	1	1.25	80
2002	4	3	21.85	23.33
2003	6	3	14.08	10
2004	14	8	60.05	21.5
2005	17	13	23.66	21.98
2006	9	3	35.36	11.67
2007	14	10	23.12	42.55
2008	10	7	30.17	23.78
2009	4	3	50.36	10
2010	6	6	59.82	15.50
Total	90	59	23.88	33.767

Iqbal [18] suggests that in recent years, there is considerably greater interest in the IPO activity in Pakistan but the IPOs form a relatively smaller component of Pakistan's market capitalization compared with some emerging markets. Table 9 displays the number of companies that have been listed on Karachi Stock Exchange during 2000–2010. Total number of IPOs during this period is 90 while the total number of IPOs included in the research study is 59. Table 9 presents that highest numbers of companies that have been listed on KSE during 2003–2007 is 60 during the sample period. The reason for this is explained by Iqbal [18], who suggests that for the year 2003–2006, the turnover of Pakistan's stock market was the highest among the selected countries. The main reasons of high-trading activity during this period are high GDP growth rates, low-interest rates, relatively stable political conditions and injection of liquidity in the form of remittances by overseas Pakistanis. The extent of underpricing is not as much different in Pakistan. Like other emerging stock markets the newly listed companies on the KSE generate significant first-day returns for its investors. Table 10 presents a comparison of under-pricing level in developing and developed markets.

Table 10: omparison of under-pricing level in developing and developed markets.

Stock markets	Time period	No. of IPOs	Underpricing	Reference
United States	1980–2001	6249	18.8%	Ritter and Welch [3]
Canada	1971–1983		11.5%	Jog and Riding [19]
France	1996–2000	305	17.13%	Chahine [4]
Hong Kong	1993–1997	256	20.76%	Agarwal *et al*. [8]
Turkey	1993–2005	217	15.68%	Kucukocaoglu [20]
Malaysia	1994–2001		46.44%	Yeap [44]
India	2002–2006	92	46.55%	Sahoo and Rajib [45]
Brazil	1980–1990	62	78%	Aggarwal *et al*. [46]
Bangladesh	1995–2005	117	156.16	Islam [17]

Table 10 shows that almost all of the developed and developing markets generate positive initial returns to the investors. Kucukocaoglu [13] suggests that the high level of under-pricing in Turkish market is due to the asymmetric information. Najam-Ud-din and Hussain [28] while comparing the efficiency of the KSE and the U.S. stock market conclude that employing the random walk with drift model shows some predictability of returns for the KSE-100 Index but not for the Dow Jones index implying that Pakistan's stock market is relatively inefficient.

6. Conclusion

This paper examines the influence of investor interest levels on initial under-pricing and further impact of investor interest on trading volume in KSE Pakistan during 2000–2010. The magnitude of share demand to offer ratio predict the under-pricing level of issue. The more the issue is under-priced, the more it attracts differentially informed investors causing a high-trading volume in the aftermarket. Firms-related specific factors and market factors are important predictors of under-pricing. Based on the empirical analysis of the study, the following conclusion can be derived about the pattern of IPO return of companies listed on the KSE.

In Pakistan secondary market, the new shares subscribed at offer price would make an average profit of 39.8%. On under-priced IPOs, investor can earn significantly high-initial return of 63.5% on first-day trading. Higher level of trading volume for the first 30 days of trading for under-priced group of IPOs shows a positive association between initial under-pricing and divergence of opinion among investors in the aftermarket. It is evident that the under-priced group has consistently more trading volume than the over-priced group. Over-subscribed issues show significant higher first-day raw return and first-day market adjusted abnormal return. Consistent with previous studies of the KSE, regression results shows that initial under-pricing is positively related to firm size, float, ex-uncertainty, and market volatility. Offer size is negatively related to the initial returns. The most remarkable result is that the subscription ratio is a strong predictor of initial returns, trading volume also presents a positive relation with under-pricing.

In Pakistan secondary market, investors can generate high-initial abnormal return by investing in IPOs. Investor should subscribe for new issues at offer price to earn high-abnormal returns at the first days of trading. Decision to invest in a particular security can be made after investigating the characteristics of the most important variables determining the value of under-pricing as float, firm size, and offer size variables. Firms should under-price IPO issues to attract differently informed investors to participate in IPO activity; this participation will increase the subscription rate in primary market and create divergence of opinion among investors at the time of trading.

Competing Interests
Authors do not have any competing interests.

Authors' Contributions
SK as a research student in MS has worked under the supervision of SA. This manuscript is generated from the MS dissertation.

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