Determinants of IPO's Long-run Performance: Case of Pakistan Stock Exchange

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Abstract:

The aim of the study is to examine the determinants of IPO's long-run performance (underperformance) in Pakistan. The long-run performance is measured by using buy-and-hold adjusted returns (BHAR) based on both equally-weighted (EW) and value-weighted (VW) schemes. Moreover, this study utilized three estimators namely ordinary least square, logit, and probit regression to analyze the IPO's long-run performance. The study found that Pakistani IPOs are significantly underperformed in the long-run based on both EW and VW schemes. The 3-year EW and VW average BHAR is reported as -49.20, and -0.51%, respectively.As such, the degree of underperformance based on VW scheme are less than the EW scheme, indicated that in Pakistan larger firms perform well than smaller firms.The regression result revealed that the long-run performance in Pakistan is significantly influenced by; initial returns, underwriter reputation, oversubscription ratio, PIPO, munificence, dynamism, market condition, and market sentiment. The result strongly supports the divergence of opinion between informed and uniformed investors in Pakistan.

Keywords: Long-run performance, underperformance, buy-and-hold returns, divergence of opinion

Introduction

Initial public offering (IPO) is the recognition of achievement for entrepreneurs, venture capitalists and board of directors to establish strong business organisation. Moreover, a business organisation demonstrates its success by creating values for employees, customers, and investors by issuing shares to general public. According to Allison

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et al. (2008), an initial public offering is a remarkable decision in the life of a firm that enables it to enter a new stage of life as a public company that possesses its own unique opportunities, risks and challenges. Thus, the success and failure of IPOs are highly depending on the aftermarket performance. Extensive literature documented that IPOs generated abnormal positive returns in the short-run and negative abnormal returns in the long-run known as underperformance. The underperformance is considered a direct loss of money for the issuing firm as well for the investors.Considerable studies documented that firm-specific characteristics determine IPO's long run performance (Anderson *et al.*, 2015; Sahoo and Rajib, 2010; van der Geest and van Frederikslust, 2001; Carter and Manaster, 1990). The firm characteristics such as initial returns, age of firm, size of firm, oversubscription, and financial strength indicate the divergence of opinion surrounding IPO's firms, henceforth influencing the long-run returns. Nevertheless, the seminal study of Ritter (1984) highlighted that the IPOs underperformance depend on the market condition at the time of offering. Favourable pre-IPO market conditions can cause more optimistic expectations on the prospect of the firm and more favourable initial return leads to underperformance in the long-run.

Ajlouni *et al.* (2009) documented that the variation in the IPOs underperformance was resulted from the industry effect. The industry is important to estimate and evaluate the growth and risk of a business, subsequently affecting the aftermarket performance. Thus, industry related factors could not be ignored as it could differently affect aftermarket performance of IPOs. Previous studies mainly used industries dummies to control the industry effect (e.g. Dhamija and Arora, 2017, Reber and Vencappa, 2016; Perera and Kulendran, 2016; Anderson *et al.*, 2015; Ho, 2015; Agathee *et al.*, 2014; Boissin and Sentis, 2014). Such techniques do not deliver a vibrant description displaying the existing consequence of a particular industry's direct impact on IPO's long-run performance. Therefore, this permits the need to investigate the direct impact of industry level determinants such as munificence, dynamism and industry concentration on IPO's long-run performance. Thus, this study aims at determining the significant determinants of IPO's long-run performance at firm, and country level in addition of industry-level factors.

Since, an extensive review of literature stipulates that IPO's aftermarket performance is comprehensively discussed in developed markets. However, this imperious topic could not fascinate much attention in the developing and emerging markets. Loughran *et al.* (1994) argued that IPO firms and investors are more affected in the developing countries as

compared to developed countries due to differences in institutional settings. Thus, this study serves to investigate the significant determinants of IPO's long-run performance within emerging market of Pakistan.

Literature Review

International Evidence on IPOs Long-run Underperformance

It is extensively discussed in the literature that underperformance phenomena are associated with the long-run performance of IPOs. The term long-run underperformance refers to the negative abnormal return of IPOs generated during their first few years of listing as compared to the market return. Extensive empirical literature documented that IPOs in the long-run underperform and generates abnormal negative returns (Agathee *et al.*, 2014; Sohail and Nasr, 2007; Ahmad- Zaluki *et al.*, 2007; Procianoy and Cigerza, 2007; Suchard and Singh, 2007; Ibbotson *et al.*, 1994; Ritter, 1991; Aggarwal and Rivoli, 1990; Ibbotson *et al.*, 1988; Ibbotson, 1975; Ibbotson and Jaffe, 1975; Logue, 1973; Reilly and Hatfield, 1969). In developed markets,Levis (1993) argued that IPOs in the UK capital market underperform relative to non-issuing firms in the same way explained by Ritter (1991). However, Espenlaub *et al.* (2000) investigated the long-run performance of UK IPOs and reported significant underperformance of IPOs issued during 1985-1992. They further argued that IPO's long-run performance varies over different time periods. Likewise, Boabang (2005) examined the short-run, medium-run and long-run performance of unit trust IPOs issued during 1990-2000 in Canadian capital market. They found that unit trust IPOs are fairly priced in the long-run but underperformed relative to the market index. Their study concluded that the Canadian unit trust IPO market appeared to be inefficient in the short and long run, but over the medium term, the market appeared to be efficient.

In emerging and in developing economies, Cai *et al.* (2008) investigated the performance of Chinese A-share IPO in the long-run during 1997 to 2001 and documented -30% of underperformance. In another study, Dhamija and Arora (2014) investigated the long-run performance of IPOs in India during 2007-2010 and documented underperformance of -35.22%. Agathee *et al.* (2014) examined the long-run performance of IPOs in Mauritius issued during 1989-2010 and found significant underperformance of -16.5%. Table 1, shows that the international evidence on the existence of IPO's underperformance is mixed. In majority countries, IPOs underperform while in Korea, Malaysia and Sweden, over-performance is reported. This elucidates that the international evidence on the existence of IPO's underperformance is somehow mixed

Table 1: Evidence of Long-run Performance

Country	Source	Avg. Long-run returns
Developed countries		
Australia	Lee *et al.* (1996a), Dimovski and Brooks (2004),	-46 %
Canada	Jog and Srivastava (1994), Kooli and Suret (2004)	–17.9 %
Germany	Ljungqvist (1997), Günther and Rummer (2011)	–12.1%
Japan	Cai (1998), Kutsuna *et al.* (2009)	–27.0 %
Korea	Kim *et al.* (1995)	+2.0
Singapore	Dawson (1987), Lee *et al.* (1996b)	–9.2 %
Sweden	Loughran *et al.* (1994)	+1.2
United Kingdom	Chambers and Dimson (2009)	–15.0 %
United States	Ibbotson *et al.* (1994), Schultz (1993), Loughran and Schultz (2006), Chan (2014)	-10%
Developing countries		
Brazil	Aggarwal *et al.* (1993)	–47.0 %
China	Chan *et al.* (2004), Cai *et al.* (2008)	–30 %
India	Dhamija and Arora (2014), Marisetty and Subrahmanyam (2010)	-29 %
Malaysia	Ahmad- Zaluki *et al.* (2007)	+17.9 %
Mauritius	Agathee *et al.* (2014)	-16.5%
Pakistan	Sohail and Nasr (2007)	-19.67%
SriLanka	Galagedera and Peter (2007)	-31%

This table is based on the country vise seminal studies, taken from 'Initial Public Offerings: International Insights' by Loughran et al. (1994, 2014).

Note: A negative (–) sign indicates long-run underperformance and a positive (+) sign indicates long-run over-performance.

Determinants of IPO's Long-run Performance and Hypothesis development

Determinants of IPO's long-run performance are used to explain the underperformance phenomena in relation with theoretical and empirical support. Based on the previous literature, a large strand of studies endeavoured to develop the understanding of factors (determinants) which directly or indirectly affect the long-run aftermarket performance of IPOs. In this study the determinants are selected based on three conditions(i) more discussed in the previous literature, (ii) more relevant to Pakistan, and (iii) availability of the data.

Firm-level Determinants:

Initial returns and IPOs long-run performance

Initial returns refer to the positive average abnormal returns generated by IPOs over a short period of time after the issuance. Shiller (1990) argued that IPOs firms with high initial returns are appeared to generate low returns in the long-run. They further explained that, to attract more investors underwriter deliberately underprice the offerings which in result generates high initial returns in the short-run. As more information disclosed to the market with the passage of time, firms with high initial returns subsequently underperform in the long-run. Similarly, Carter and Manaster (1990) argued that underwriter deliberately underprice the issue to pass the signal of quality to investors at the time of offering which thereafter underperforms in the long-run. Following the argument of Shiller (1990) and Carter and Manaster (1990) that firms with high initial returns subsequently underperform in the long-run, extensive literature documented negative relationship between short-run initial returns and the long-run performance of IPOs (e.g. Chi *et al.*, 2010; Kutsuna *et al.*, 2009; Cai *et al.*, 2008;Ahmad -Zaluki *et al.*, 2007). Therefore, this study expects negative relationship between initial returns and long-run returns of IPOs.

H_1: There is a negative relationship between initial returns and the IPOs long-run performance.

Firm's Size and IPOs long-run performance:

Size of the firm is an imperative indicator for firm external financing ability and are considered less risky than a small firm. In case of IPOs, the divergence of opinion hypothesis suggested that larger firms perform better in the long-run as compared to the small firms. Larger firms have less information asymmetry due to its good reputation and generate better returns in the long-run. Numerous studies documented positive relationship between firm's size and long-run performance of IPOs (e.g. Banu Durukan, 2002; Belghitar and Dixon, 2012; Bird and Yeung, 2010;

Brav and Gompers, 1997; Goergen et al., 2007; How , 2000; Loughran and Ritter, 1995; Minardi et al., 2013; Ritter, 1991). Thus, based on divergence of opinion this studyexpects a positive relationship between the size of the firm and long-run performance of IPOs.

H_2: There is a positive relationship between firm's size and the long-run performance of IPOs.

Underwriter Reputation and IPOs long-run performance:

Carter et al. (1998) and Shaw (1994) empirically found that IPOs handle by reputable underwriter are tends to less underperform in the long-run than IPOs managed by lower prestigious underwriters. The IPOs handled by reputable underwriter have less divergence of opinion and therefore tends to less underperform in the long-run. Similarly, Dong *et al.* (2011), Chan *et al.* (2004), Brav and Gompers (1997), Booth and Smith (1986) and Chemmanur and Fulghieri (1994) examine the impact of underwriter reputation on the long-run performance of IPOs and documented significant positive relationship. However, some studies documented anegative relationship between underwriter reputation and long-run performance (e.g. Su and Bangassa, 2011; Thomadakis et al., 2012; Wang et al., 2003). Wang et al. (2003) elaborated that underwriter deliberately underprices the offerings which subsequently underperform in the long run.Afza *et al.* (2013) found a positive relationship between underwriter reputation and the short run performance in Pakistan. This signifies that in Pakistan underwriter deliberately underpriced the IPOs in the short run which may generate a lower return in the long run. Therefore, this study expects a negative relationship between underwriter reputation and long-run performance of IPOs.

H_3: There is a negative relationship between underwriter reputation and the long-run performance of IPOs.

Oversubscription Ratio and IPOs Long-run Performance

Cornelli and Goldreich (2003)posit that the high pre-market investors demand shows the existence of irrational investors. The higher the demand of irrational investors the higher will be the underpricing and subsequently, IPO underperforms in the long-run. Hence, highly demanded (oversubscribed) IPOs are associated with lower returns in the long run. Similarly, Ljungqvist *et al.* (2006) argued that higher demanded IPOs are subject to higher ex-ante uncertainty and divergence of opinion between rational and irrational investors. Therefore, IPOs underperform in the long run. Kafayat and Farooqi (2014)reported the significant positive relationship between oversubscription rate and short-run returns in Pakistan. This shows that in Pakistan oversubscribed

(highly demanded) IPOs are more underpriced in the short run. While the divergence of opinion hypothesis suggested that such IPOs underperform in the long run. Therefore, this study expects a negative relationship between long-run performance and oversubscription ratio of IPOs.

H_4: There is a negative relationship between oversubscription ratio and the long-run performance of IPOs.

Privatized-IPOs (PIPOs) and IPOs Long-run Performance

Huibers and Perotti (1998) argued that privatization IPOs can be considered riskier than conventional IPOs due to the considerable political and government influence on the firm's management. It is well discussed in the literature that PIPO is more underpriced in the short-run as compared to private IPOs. However, Boubakri and Cosset (2000)examined the long-run performance of PIPOs in 26 developing countries and documented large positive returns of PIOPs over a longer horizon. Similarly, Perotti and Van Oijen (2001)investigated the long-run returns of PIPOs in 20 developing countries and reported significant large positive returns. In the same way, Megginson *et al.* (2000) reported a significantly positive aftermarket performance of privatizations IPOs in the long-run by using a large sample of 33 countries both developing and developed countries. In Pakistan stock market, Rizwan and Khan (2007) examined public sector privatize IPOs and private sector IPOs during 2000-2006, and documented significant positive returns over alonger horizon. Thus, this study expects apositive relationship between these two variables.

H_5: There is a positive relationship between PIPOs and the long-run performance of IPOs.

Industry-level Determinants

Munificence and IPOs Long-run Performance

Dess and Beard (1984) explained that the ability of an environment to maintain persistent growth is called munificence. The industries operating in munificent environment tends to have a larger level of opportunities as compared to industries with the low munificent environment (Almazan and Molina, 2005). According to Certo *et al.* (2009), IPO firms operating in stable and persistent growth environment are more attractive than firms operating in an instable and low growth environment. Furthermore, IPOs in industries with high growth prospects has the largest economic impact on the IPO's long-run performance (Dong and Michel, 2012). Based on ex-ante uncertainty hypothesis that the firm operating in the munificent environment may exhibit lower information asymmetry and subsequently lower underpricing. If this is

the case, then based on the divergence of opinion hypothesis industry munificence may positively affect the IPO's long-run performance.

H_6: There is positive relationship between munificence and IPO's long-run performance

Dynamism and IPOs Long-run Performance

Generally, the dynamism refers to the degree and variability of variations in a firm 's external environment. There are significant differences across industries in terms of the impacts of environmental characteristics on firms (Aldrich, 2008). According to Lee *et al.* (2011), that the firm's IPO from an uncertain industry may send a positive signal to the market that the industry is growing and has a better future, which may impart the investor perception positively. Moreover, this positive information may lower the information disparity between informed and uninformed investors and subsequently lower the IPOs short-run performance. Then, based on thedivergence of opinion hypothesis, the industry dynamism may positively influence the IPO's long-run performance.

H_7: There is positive relationship between dynamism and IPO's long-run performance

Industry Concentration and IPOs Long-run Performance

The industry concentration shows the level of competition within the industry. The high concentration means low competition within industry and viceversa. According to Hoffmann-Burchardi (2001), thoseinvestors are more likely to gain information from the behavior of other firms in the industry because of competitive considerations. The competition level within the industry may cause information spillover between informed and uninformed investors and henceforth the aftermarket performance. Based on the signaling hypothesis, the IPO's firm operating in the highly concentrated industry may pass the signal of its quality by underpricing the share in the short-run in order to attract more investors. However, the divergence of opinion hypothesis suggested that the short-run returns will be reversed in the long-run. Therefore, this study expects a negative relationship between industry concentration and the IPO's long-run performance.

H_8: There is negative relationship between industry concentration (HHI) and IPO's long-run performance

Market-level Determinants:

Market Condition (Hot Issue Market)and IPOs Long-run Performance:

The 'windows of opportunity' hypothesis of long-run underperformance suggested that IPOs issued in the high-volume period will be highly valued and generates high initial returns in the short run following the lower returns in the long-run. According to Ritter (1984, 1991) and Loughran and Ritter (1995) that managers are more likely to issue shares at the period of high volume and high initial returns (hot issue market) by taking the advantage of investor's optimism. Therefore, IPOs issued in the period of high volume and high initial returns are appeared to generate lower returns in the long-run. Therefore, this study also expects anegative relationship between 'hot issue' market and the long-run performance in Pakistan.

H_9: There is a negative relationship between 'hot issue' market and the long-run performance.

Market Sentiment and IPOs Long-run Performance

In general, during the period of high market sentiment, exuberant investors assumed growth prospect of the issuing firm and tends to overvalue the IPO shares in the early market. Due to the overvaluation IPOs generate high initial returns in the short-run and lower returns in the long-run. Cornelli *et al.* (2006), and Ljungqvist *et al.* (2006) argued that the investor's sentiment at the time of the offering is positively related with IPO prices (underpricing) in the early aftermarket and negatively related to IPO prices (underperformance) in the long run. Similarly, Aggarwal and Rivoli (1990) argued that IPO returns fads with the passage of time due to the existence of exuberant investors. Initially, exuberant investors overreact and tend to purchase IPOs at a higher price than market value which subsequently underperforms in the long-run. Therefore, this study expects a negative relationship between these two variables in Pakistan.

H_{10}: There is a negative relationship between market sentiment and long-run performance of IPOs.

Market Volatility and IPOs Long-run Performance

Market volatility is usually used as a measure of risk and uncertainty, surrogates for the divergence of opinion. The high ex-ante market volatility exhibits large uncertainty in the market returns which may lead to the higher divergence of opinion among investors. Zarafat and Vejzagic (2014) argued that market volatility as an ex-ante uncertainty and divergence of opinion play a crucial role in investor's decision. Based on the divergence of opinion hypothesis, the market volatility may

cause to lower the long-run performance. Therefore, this study expects a negative relationship between these two variables.

H_{11}: There is a negative relationship between market volatility and long-run performance of IPOs.

Research Methodology

Data and Data Collection

This study examines the IPO's long-run performance listed on Pakistan Stock Exchange (PSX) during the period 2000 to 2015. There are total 77 non-financial firms that conducted IPOs during 2000 to 2015 in PSX. This study excludes the financial firms due to its different behaviour than non-financial firms. All the firms that conducted IPO during 2000-2015 are identified from the KSE database available on PSX website (www.psx.com.pk). The closing and opening price data for each firm will be collected from DataStream and KSE database. Similarly, the closing and opening prices of KSE-100 index will be collected from DataStream and KSE database. The data about listing history, underwriter selection, age, size, leverage, and oversubscription ratio are collected from firm's prospectus issued at the time of offerings.

Long-run Performance Measurement

This study uses the Buy-and-Hold Adjusted Returns (BHAR) as a measurement of IPO's long-run performance. The BHAR is an investment strategy in which an investor buy stocks and hold it for a long time. Kooli and Suret (2004) argued that buy-and-hold returns have the ability to capture the investor experience. Equation 1 provides the estimation of BHAR. .

$$R_{jT} = \prod_{t=1}^{T}\left(1 + r_{jt}\right) - 1 \quad (1)$$

where R_{jT} is the buy-and-hold returns of the IPO firm 'j' at time T, while T is the number of months for which investors hold the IPO stocks. Here T is 36 months, as this study is examining the long-run performance up to 3 years period of time. r_{jt} is the total raw return of IPO firm 'j' at the event month 't'. Similarly, the benchmark adjusted buy-and-hold returns are computed as follow,

$$BHAR_{jT} = \left[\prod_{t=1}^{T}\left(1 + r_{jt}\right) - 1\right] - \left[\prod_{t=1}^{T}(1 + r_{mt}) - 1\right] \quad (2)$$

where $BHAR_{jT}$ is the buy-and-hold adjusted returns of firm 'j' at the event month 't'. r_{jt}, is the raw return of firm 'j' at the event month 't', however r_{mt} is the market return at the time of event month 't'. The mean equally-weighted BHAR of all the firm at the event month 't' is computed as,

$$ABHAR_t = \frac{1}{n}\sum_{j=1}^{nt} BHAR_{jT} \quad (3)$$

$ABHAR_t$is the equally-weighted average buy-and-hold adjusted returns on a portfolio of n stocks for event month t. $BHAR_{jT}$ is the buy-and-hold adjusted returns of firm 'j' in the event month 'T'. Similarly, the value-weighted BHAR is given below,

Determinants of IPO's Long-run Performance

This study employs the regression analysis using firm's cross-sectional data. In line with the objectives of the study, this study uses three main estimations to determine the long-run performance of IPOs. These estimations are; multivariate OLS model, binary Logit and Probit model. OLS identifies the linear relationship between the IPO's long-run performance and the explanatory variables, which also happen to minimize the error between estimated and actual observed points (Hill *et al.*, 2008). However, OLS does not provide the associated probabilities (risks) of determinants that indicate the directional changes in market performance (Perera, 2014). Thus, for the robustness of the results, this study tends to investigate the significant determinants of IPO's long-run performance by using the OLS, logit, and probit regression.

Equation 4 shows the determination of IPO's long-run performance based on OLS. where, $\ln(BHAR_{jT})$is the logarithm of buy-and-hold adjusted returns of firm j at time T.

$$\ln(BHAR_{jT}), = \beta_0 + \beta_1 IR_j + \beta_2 Fsize_j + \beta_3 Urep_j + \beta_4 Osub_j + \beta_5 PIPO_j + \beta_6 HHI_j + \beta_7 Muni_j + \beta_8 Dyn_j + \beta_9 MC_j + \beta_{10} MS_j + \beta_{11} MV_J + \varepsilon_j \quad (4)$$

However, Equation 5 shows the determination of IPO's long-run performance based on logit and probit models

$$\ln\left(\frac{P_j}{1-P_j}\right) = \beta_0 + \beta_1 IR_j + \beta_2 Fsize_j + \beta_3 Urep_j + \beta_4 Osub_j + \beta_5 PIPO_j + \beta_6 HHI_j + \beta_7 Muni_j + \beta_8 Dyn_j + \beta_9 MC_j + \beta_{10} MS_j + \beta_{11} MV_j + \varepsilon_j \quad (5)$$

whereP_j is the probability of overperformance in the long-run. However, $1 - P_j$ is the probability of overperformance does not occurs in the long-run.β_0 is the intercept of the equation . IR is initial returns (underpricing), $Fsize$ is the size of the firm, $Urep$ is the dummy variable shows underwriter reputation. $Urep$ will takes the value of '1' if the offering is undertaken by reputable underwriter, otherwise '0'. $Osub$ is oversubscription ratio of the offering firm, $PIPO$ is the dummy variables take the value of '1' if the offering firm is privatized IPO, otherwise '0'.HHI is the Herfindahl–Hirschman index measured the industry concentration, $Muni$ is the munificence, and Dyn is the dynamism. MC is the dummy variable shows hot issue market, takes the value of '1' if the IPO is issued during hot market and '0' if issued in cold issue market. MS is the market sentiment, computed as cumulative market returns for the 3-month period preceding the first day of trading, $MV$is the market volatility, computed as the standard deviation of daily market returns over the three months before the closing date of subscription. The techniques used to measure the explanatory variables are derived from previous studies and are summarized in Table 2.

Table 2: Computation of Independent Variables

Variable	Measurement	Study
Dependent Variable		
BHAR	Buy-and-hold is an investment strategy in which an investor buys stocks and hold it for a long time.	Gompers and Lerner (2003), Su and Bangassa (2011),
Independent Variables		
Firm-Level		

Variable	Measurement	Study
Initial return (IR)	One-day excess return of the IPO firm, corresponding to the one-day return for the market index	Paudyal *et al.* (1998), Agathee *et al.* (2014)
Size of the firm (Fsize)	Size of the firm is determined from the offering size, where offering size is measured as, total number of issued shares multiplied by the offer price.	Banu Durukan (2002), Belghitar and Dixon (2012),Bird and Yeung (2010).
Underwriter reputation (Urep)	A dummy variable value of "1" indicates prestigious underwriter and zero value will indicate non-prestigious underwrite. Reputation of an underwriter is calculated by adding up the frequency of IPOs an underwriter carries out and dividing this by the total number of IPOs carried in the whole sample period.	Dong *et al.* (2011), Chan *et al.* (2004), Agathee *et al.* (2014).
Oversubscription ratio (Osub)	Oversubscription ratio is the total number of subscribed shares divided by the total number offered shares.	Chowdhry and Sherman (1996), Agarwal *et al.* (2008), Jain and Padmavathi (2012)
Privatized IPO (PIPO)	Privatize IPO is the public offering of a state-owned firm. PIPO is a dummy variable equal to 1 for privatization IPOs and 0 for conventional IPOs.	Tu *et al.* (2013), Menyah and Paudyal (1996)
Industry-level		

Variable	Measurement	Study
Munificence (Muni)	Munificence is measured in two steps; a. "Regressing time against sales of an industry over the previous 10 years of period" and; b. "Taking the ratio of the regression slope coefficient to the mean value of sales over the same period".	Jain and Kini (2006), Kayo and Kimura (2011), Chen *et al.* (2015)
Dynamism (Dyn)	Dynamism is calculated as the "Standard error of the munificence regression slope coefficient divided by the mean value of sales over this period".	Jain and Kini (2006), Kayo and Kimura (2011), Chen *et al.* (2015)
Industry concentration (HHI)	Industry concentration is widely measured through Herfindahl–Hirschman Index (HHI). HHI is calculated by summing the squared of percentage of market shares held by the firms within a given industry.	Jain and Kini (2006), Chen *et al.* (2015)
Market-Level		
Market Condition (MC)	Market condition is a dummy variable takes the value of 1 if the market is "hot" and takes the value of zero if the market is cold.	Ritter (1984), Ibbotson *et al.* (1994), Loughran and Ritter (1995),
Market sentiment (MS)	Cumulative market returns for the 3-month period preceding the first day of trading is used as a proxy for market sentiment/investor sentiment.	Amihud *et al.* (2003), Kiymaz (2000), Samarakoon (2010).

Variable	Measurement	Study
Market volatility (MV)	Market volatility (MV) is computed as "the standard deviation of daily market returns over the three months before the closing date of subscription".	Paudyal *et al.* (1998), Omran (2005), Al-Hassan *et al.* (2010), Omran (2005),.

Data Analysis and Findings

Long-run Performance based on Buy-and-hold Returns (BHAR)

Table 3 reports the buy-and-hold adjusted returns for the first 12, 24 and 36 months after the listing date for the 77 IPOs issued during 2000-2015. The monthly average returns are given in percentage along with conventional t-statistics. In effect, Barber and Lyon (1997) argued that the BHAR returns are usually positively skewed, in such situation the conventional t-statistics, leading to overstated significance levels. Therefore, in addition to conventional t-statistics, this study uses the bootstrapped skewness-adjusted t-statistic as developed by Lyon et al. (1999) to estimate the true t-values.

Table 3: Buy-and-hold Adjusted Returns

Month	N	Equally Weighted (EW)			Value Weighted (VW)		
		BHAR	Bootstrap t-stat	t-stat	BHAR	Bootstrap t-stat	t-stat
1	77	1.84	0.28	0.466	-1.42	-0.57	-0.720
2	77	2.59	0.16	0.427	-0.11	-0.05	-0.039
3	77	2.72	0.25	0.418	0.40	0.06	0.089
4	77	1.96	0.37	0.304	-3.70	-0.53	-0.542
5	75	1.14	0.58	0.176	-1.04	-0.15	-0.144
6	75	-0.80	-0.76	-0.121	-3.69	-0.44	-0.496
7	75	-6.59	-0.82	-0.965	-8.93	-1.07	-1.079
8	74	-9.71	-0.93	-1.308	-8.88	-1.18	-1.134
9	74	-10.12	-1.12	-1.308	-5.88	-0.64	-0.700
10	74	-10.87	-1.18	-1.387	-10.53	-1.22	-1.148
11	72	-11.29	-1.38	-1.285	-10.61	-1.16	-1.193
12	**69**	**-9.23**	**-1.53**	**-0.936**	**-12.69**	**-1.26**	**-1.294**
13	68	-7.99	-1.38	-0.766	-5.02	-0.22	-0.376
14	68	-8.67	-1.34	-0.807	-1.83	-0.19	-0.118
15	68	-12.06	-1.38	-1.172	-2.85	-0.15	-0.292
16	68	-11.14	-1.25	-1.013	-4.94	-0.36	-0.518
17	67	-9.68	-1.22	-0.846	-3.21	-0.24	0.287

Month	N	Equally Weighted (EW) BHAR	Bootstrap t-stat	t-stat	Value Weighted (VW) BHAR	Bootstrap t-stat	t-stat
18	66	-8.49	-1.12	-0.652	-1.66	-0.13	-0.152
19	66	-7.04	-1.06	-0.509	-4.30	-0.31	-0.340
20	66	-8.53	-1.04	-0.591	-1.47	-0.12	-0.130
21	66	-8.57	-1.47	-0.638	-1.59	-0.5	-0.166
22	65	-8.63	-1.76**	-0.638	-3.09	-0.29	-0.329
23	63	-11.58	-1.95**	-0.818	-5.24	-0.39	-0.695
24	**62**	**-20.34**	**-2.64****	**-1.575**	**-3.66**	**-0.29**	**-0.581**
25	62	-22.15	-2.89***	-1.65**	-8.27	-0.77	-0.980
26	62	-23.06	-3.19***	-1.67**	-11.51	-0.84	-0.981
27	61	-25.21	-2.82***	-1.74**	-14.34	-0.98	-1.062
28	60	-20.28	-2.09**	-1.171	-14.27	-1.36	-1.296
29	60	-19.84	-0.99	-0.904	-15.19	-1.28	-1.262
30	60	-32.11	-3.69***	-1.99**	-10.07	-0.89	-0.919
31	60	-38.05	-3.94***	-2.35**	-6.01	-0.6	-0.668
32	60	-41.67	-3.48***	-2.62***	-2.20	-0.22	-0.248
33	60	-46.27	-3.61***	-3.14***	0.83	-0.1	-0.091
34	60	-49.09	-3.35***	-3.11***	-1.11	-0.08	-0.132
35	60	-47.03	-3.35***	-2.97***	-2.06	-0.18	-0.256
36	**60**	**-49.20**	**-3.32*****	**-2.99*****	**-0.51**	**-0.03**	**-0.060**

*This table shows the Buy-and-hold adjusted returns (BHAR) given in percentage, along with t-statistics for the 36 months after listing, BHAR is given based on both equally weighted (EW) and value-weighted (VW) schemes. The significance level of t-statistics and bootstrap t-statistics are as follow, *** Significant at the 1% level, ** Significant at the 5% level, *Significant at the 10% level.*

Table 3 shows that IPO generated positive returns (overperformance) up to 5 months after the listing based on BHAR under EW scheme. However, from month 6 to 36, IPOs are significantly underperformed and generates negative returns. The underperformance in terms of BHAR (EW) also shows increasing trend can be observed from Figure 1. In the year one (at 12 months) IPOs are underperformed at -9.23%, in the year two of listing (at 24 months) underperformance increases to -20.34%, and in the year three of listing (at 36 months) IPOs underperformance reached to -49.20%. The pragmatic underperformance of IPOs in the year one is statistically insignificant, however, the underperformance in the years two and three are statistically significant at 5% and 1% level, respectively. The highest underperformance (i.e. -49.20%) based on BHAR (EW) is recorded at the thirty-sixth month of seasoning, while the

lowest underperformance is -0.80 % in the sixth month of seasoning. This trend of the long-run performance under BHAR (EW) is same to the performance as observed in the series of CAR (EW).

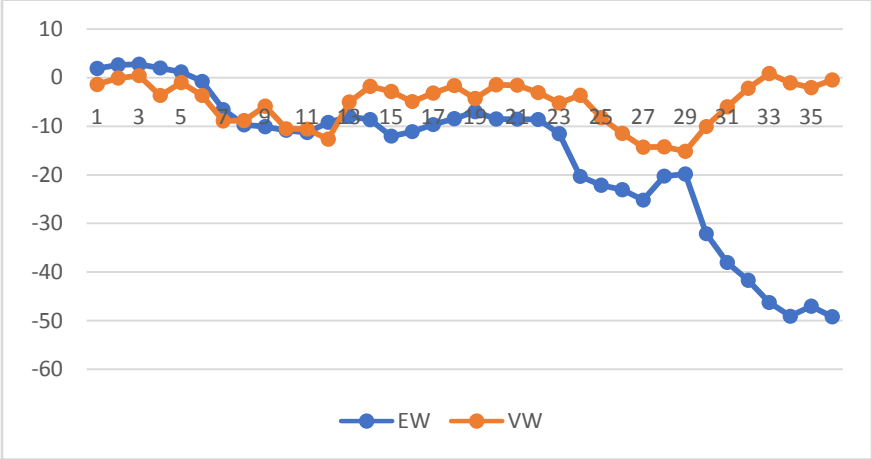

Figure 1: Buy-and-hold Adjusted Returns (BHAR)

The result of BHAR under VW scheme indicates that there is persistent underperformance from the first month of seasoning till the 36th month of seasoning. Unlike, the EW scheme the result of VW shows the decreasing trend in the underperformance. At the beginning, particularly in the mid of the year one and year two the underperformance is relatively high than the end of the year three (see figure 4.2). In the year one (12 months) underperformance is -12.69%, in year two (24 months) underperformance drops to -3.66%, and in the year-three underperformance drops to -0.5%. All the BHAR returns under VW scheme are statistically insignificant. The highest underperformance under BHAR (VW) is -14.34% in the 27th month of seasoning, while the lowest underperformance is -0.11% in the 2nd month of seasoning. Moreover, Table 4.15 shows that the underperformance based on BHAR under VW scheme is less pronounced (-0.51% in 36th month) than the BHAR under VW scheme (-49.20%). This indicates that the larger IPO firms performed well in the longer horizon as compared to the smaller IPOs. It can also be observed from the Table 4.15 that most of the returns based on BHAR (VW) are statistically insignificant.

Long-run Performance Segmentation by Listing Years

Table 4 provides the year wise distribution of IPO's long-run performance in Pakistan over the period 2000-2013 measured as CAR,

BHAR, and WR based on EW scheme. It can be observed that the IPOs are underperformed across all the years except 2001, 2002 and 2013 where IPO's are on average overperformed showing positive returns. This shows that investors earned on average positive returns in the long-run by investing in IPOs issued during 2001, 2002 and 2013. However, in the rest of the years' investors lose money in the long-run by investing in IPOs. The highest degree of underperformance is recorded for IPOs issued in 2004 followed by 2008, 2007, 2012, 2010, 2003, 2000 and 2005.

Table 4: Underperformance Segmentation by Listing Years

Year	N	BHAR
2000	3	-79.11
2001	1	12.70
2002	5	17.99
2003	4	-60.10
2004	9	-108.32
2005	11	-19.83
2006	0	--
2007	7	-47.72
2008	4	-63.08
2009	4	-48.14
2010	5	-100.68
2011	3	-29.95
2012	2	-103.29
2013	2	97.43

This table presents the year wise distribution of long-run performance for 60 Pakistani IPOs from 2000-2013 measured as CAR, BHAR and WR based on EW scheme. N is the total number of firms per year

Long-run performance Segmentation by Industries

Table 5 provides the industry wise distribution of long-run performance in Pakistan for the period 2000-2013. The result shows that IPOs are underperformed across all the industries except food producers, where IPOs are on average overperformed the benchmark. The highest underperformance is recorded for technology and communication industry (i.e. CAR -47.91%, BHAR -101.53%, WR 0.64), followed by chemical industry (i.e. CAR -43.16%, BHAR -82.50%, WR 0.50), and power generation and distribution (i.e. CAR -29.67%, BHAR -55.50%, WR 0.57). The large variations in the long-run returns across industries indicates that Pakistan industries are diverse in nature.

Table 5: Underperformance Segmentation by Industries

Industry	N	BHAR
Chemicals	7	-82.50
Construction and Materials	13	-25.42
Food Producers	3	138.84
Fuel & energy	9	-28.34
Power Generation and Distribution	6	-55.50
Technology and Comm.	14	-101.53
Textiles	8	-56.39

The table presents the industry wise distribution of long-run performance for 60 Pakistani
IPOs from 2000-2013 measured as CAR, BHAR, and WR based on EW scheme. N is the total number of firms per year.

Regression Analysis of Long-run Performance

In this section, numerous cross-sectional regression models are estimated by using ordinary least squares (OLS) regressions, binary logit, and probit models to evaluate the significant determinants of IPO's long-run performance. The long-run performance is measured as 3-years post-listing period by using the buy-and-hold abnormal returns (BHAR). Table 6 provides the determinants of IPO's long-run performance based on OLS, binary logit and probit regression models.The sample size is relatively small, therefore in order to avoid the non-normality of the data and to construct the robust t-values for each parameter, this study additionally uses the bootstrap procedure as developed by Efron (1992, 1979). The following subsections explain the significant determinants of IPO's long-run performance in Pakistan.

Table 6: Determinants of Long-run Performance

	OLS		***Binary Model***	
	Conventional values	***Bootstrap values***	***Logit***	***Probit***
Constant	-8.19 (-4.23)***	-8.19 (-3.23)***	-85.24(-1.60)	-42.88(-2.54)**
Firm-Level Variables				
Initial returns (IR)	-0.54 (-3.16)***	-0.54(-2.58)***	-14.59(-2.61)***	-7.91(-3.59)***
Size of the firm (Fsize)	0.04(0.53)	0.04(0.47)	0.75(1.08)	0.47(1.06)
Underwriter reputation (Urep)	0.43(2.60)**	0.43(2.31)**	4.32(1.83)*	2.27(2.55)**
Oversubscription ratio (Osub)	-0.02(-0.22)	-0.02(-0.21)	-1.64(-2.29)**	-0.87(-3.04)***
Privatize IPO (PIPO)	0.28(1.18)	0.28(1.01)	7.04(2.26)**	3.80(2.58)***
Industry-level Variables				
Industry concentration (HHI)	-0.04 (-0.64)	-0.04(-0.62)	-0.01(-0.01)	-0.07(-0.44)
Munificence (Muni)	6.06(3.98)***	6.06(2.75)***	62.80(1.54)	31.45(2.34)**
Dynamism (Dyn)	14.37(2.18)*	14.37(1.75)**	34.45(2.02)**	175.3(2.61)***
Market-level Variables				
Market condition	0.07(0.41)	0.07(0.35)	-4.84(-2.40)**	-2.65(-2.13)**
Market Sentiment	1.16 (2.65)***	1.16(2.10)**	6.42(1.33)	4.15 (1.30)
Market volatility	-6.39 (-1.27)	-6.39(-0.43)	36.25(0.75)	14.81(0.83)
F-value	10.52***	10.52***		

	OLS		***Binary Model***	
	Conventional values	***Bootstrap values***	***Logit***	***Probit***
Likelihood Ratio			46.89***	46.42***
R-squared	0.63	0.63	0.72	0.71
Adjusted R-squared	0.52	0.52	0.26	0.25
Observations	60	60	60	60

*This table presents the overall (firm-and-offering, industry and country level) determinant of IPO's long-run performance based on OLS regression model. The dependent variable is buy-and-hold adjusted returns (BHAR). The coefficient of each variable is given with t-ratio in parentheses along with significant level. The t-ratios are computed by robust standard errors to heteroscedasticity and bootstrapped procedure.The significance level as follows, *** Significant at the 1% level, ** Significant at the 5% level, *Significant at the 10% level.*

Long-run Performance and Initial Returns:

Initial returns maintain significantly a negative relationship with IPO's long-run performance, implies that in Pakistan highly underpriced IPOs performed worse in the long-run as compared to low underpriced firms. This empirical result highly validates the outcomes of previous studies (i.e. Chi *et al.*, 2010; Kutsuna *et al.*, 2009; Cai *et al.*, 2008; Ahmad -Zaluki *et al.*, 2007; Johnston and Madura, 2002; Ritter, 1991; Aggarwal and Rivoli, 1990). Moreover, this empirical evidence is in line with the prediction of impresario/fad hypothesis of Shiller (1990). This shows that in Pakistan, underwriter act as impresario and induced deliberate underpricing in the short-run. As such, the more information revealed to the market the high initial returns tends to fads with the passage of time and subsequently underperform in the long-run.

Long-run Performance and Underwriter Reputation

The underwriter reputation maintains significantly a positive relationship with IPO's long-run performance. This specifies that in Pakistan IPOs underwritten by prestigious underwriters perform well in the long run than IPOs issued by non-prestigious underwriters. This empirical evidence is in line with the findings of previous studies (Dong *et al.*, 2011; Chan *et al.*, 2004; Brav and Gompers, 1997; Chemmanur and Fulghieri, 1994; Booth and Smith, 1986). Moreover, this result strongly supports the conventional wisdom of divergence of opinion hypothesis of Miller (1977). The IPOs handled by reputable underwriter has less divergence of opinion and therefore tends to less underperform in the long-run (Carter *et al.*, 1998; Michaely and Shaw, 1994). This means that in Pakistan, IPOs handled by the prestigious underwriter is prone to

less divergence of opinion which subsequently perform well in the long-run.

Long-run Performance and Oversubscription Ratio

As expected, the oversubscription ratio shows significantly a negative relationship with IPO's long-run performance. This indicates that in Pakistan oversubscribed IPOs perform worse than undersubscribed IPOs in the long-run. This empirical evidence is in line with the findings of previous studies (McGuinness, 2009; Agarwal *et al.*, 2008; Ljungqvist *et al.*, 2006; Cornelli and Goldreich, 2003; Chowdhry and Sherman, 1996). Furthermore, this result strongly supports the divergence of opinion hypothesis. Ljungqvist *et al.* (2006) explained that higher demanded IPOs are subject to higher ex-ante uncertainty in the short-run and divergence of opinion in the long-run. Thus, the IPOs that are oversubscribed at the time of offering shows underpricing in the short-run and underperformance in the long-run. In this relation, the result in Pakistan shows that oversubscribed IPOs are subject to the divergence of opinion due to higher ex-ante uncertainty, henceforth, the oversubscribed IPOs perform worse in the long-run.

Long-run Performance and Privatization IPOs

The privatization IPOs (PIPO) shows significantly a positive relationship with IPO's long-run performance, suggesting that privatized IPOs perform well in the long-run conventional IPOs. This statistical finding is consistent with previous seminal studies of Rizwan and Khan (2007), Van Oijen (2001), Boubakri and Cosset (2000),Megginson *et al.* (2000) and Huibers and Perotti (1998). In order to make the privatization policy successful and attractive, the government of Pakistan sold large and well-known enterprises (Rizwan and Khan, 2007). As such, the large and well-known firms are subject to less divergence of opinion and perform well over the longer horizon. Thus, the significant positive relationship between privatize-IPO and long-run performance in Pakistan is consistent with the divergence of opinion hypothesis.

Long-run Performance and Munificence

This study finds a positive relationship between munificence and IPO's long-run performance. This implies that in Pakistan, IPO firms functioning in a high munificent environment with plenty of financial resources exhibits lower underperformance in the long-run. As earlier discussed that in Pakistan, high munificent IPOs exhibits less ex-ante uncertainty and lower initial returns in the short-run. In such case, based on the divergence of opinion hypothesis, high munificent IPOs well

exhibits positive returns in the long-run. Thus, the positive relationship between munificence and IPO's long-run performance in line with the prediction of divergence of opinion hypothesis. Furthermore, this evidence also signifies the arguments of previous studies (Dong and Michel, 2012; Certo *et al.*, 2009).

Long-run Performance and Dynamism

Likewise, this study predicts a positive relationship between industry dynamism and IPO's long-run performance in Pakistan. As expected, this study maintains significant a positive relationship between industry dynamism and IPO's long-run performance. This shows that in Pakistan, the firm's IPO from a dynamic industry sent a positive signal to the investors that the market is growing, which in turns exhibits the lower divergence of opinion and subsequently lower underperformance. This empirical evidence is consistent with the divergence of opinion hypothesis and the arguments of previous studies (Ahmad and Shahzad, 2014; Benveniste *et al.*, 2003; Benveniste *et al.*, 2002; Nishat, 2001).

Long-run Performance and Market Condition

In effect, market condition maintains a negative relationship with IPO's long-run performance. This means that in Pakistan, IPOs issued in the hot market are highly underperform in the long-run than IPOs issued in cold market. This empirical evidence is consistent with the findings of previous studies (e.g. Agathee *et al.*, 2014; Thomadakis *et al.*, 2012; Bancel and Mittoo, 2009; Derrien and Kecskes, 2007; Gajewski and Gresse, 2006b; Helwege and Liang, 2004; Lowry, 2003; Lowry and Schwert, 2002; Jain and Kini, 1994; Loughran *et al.*, 1994; Ritter, 1991). Moreover, this empirical evidence is consistent with the windows of opportunity hypothesis of Loughran and Ritter (1995). This specifies that in Pakistan, managers took the advantage of investors optimism by issuing IPOs in ahot market. As a result, hot IPOs generates high initial returns (underpricing) in the short-run followed by lower returns in the long-run (underperformance).

Long-run Performance and Market Sentiment

In case of market sentiment, the findings revealed a positive relationship between market sentiment and IPO's long-run performance in Pakistan. This empirical evidence is in line with the finding of (Dimovski and Brooks, 2004), but inconsistent with the investor sentiment hypothesis. This signifies that in Pakistan, IPOs issued at the time high market sentiment generates positive long-run returns. As such, the investor sentiment in Pakistan is widely influenced by political factors than

economic and market factors (Civilize *et al.*, 2015; Ali and Khanb, 2014). Thus, the positive relationship between market sentiment and IPO's long-run performance in Pakistan is the outcome of considerable political instability and its adverse impact on the investor's perception.

Conclusion

The study aim was to examine the IPO's long-run performance and its determinants in Pakistan at firm, industry and market level. The study conducted the analysis of 77 non-financial IPO's firms listed on the Pakistan Stock Exchange (PSX) from the period of 2000 to 2015. The long-run returns are measured by using the Buy-and-hold adjusted returns (BHAR) based on both Equally-Weighted (EW) and Value-Weighted (VW) schemes.Furthermore, this study utilized three estimators such as; OLS regression model, binary logit regression model and binary probit regression model to estimate the relationship between dependent and independent variables.

This study found that Pakistani IPOs are significantly underperformed in the long-run based on both EW and VW schemes. The 3-year EW and VW average BHAR is reported as -49.20, -and -0.51%, respectively.As such, the degree of underperformance based on VW scheme are less than the EW scheme, indicated that in Pakistan larger firms perform well than smaller firms in the long-run. In order to get further insight into the characteristics of underperformance, this study further analyzed the IPO's long-run returns according to industries and listing-years. The industries long-run returns distribution specified that some of the industries are underperformed and some shows overperformance. The highest underperformance is recorded for technology & communication industry followed by chemical, and power generation & distribution industry. However, the food & producer industry shows considerably overperformance. Likewise, the distribution of returns based on listing-years shows that IPOs issued in 2001, 2002 and 2013; overperformed the benchmark in the long run. However, rest of the years IPOs shows significant underperformance, the highest degree of underperformance is recorded for IPOs issued in 2004 followed by 2008, 2007, 2012 and 2010.

The regression analysis shows that in Pakistan the long-run performance is significantly influenced by; initial returns, underwriter reputation, oversubscription ratio at firm-level;munificence, and dynamism at industry level; and market condition, and market sentiment at country level. The finding signifies that the industry-related upshots clarify that the industry munificence, and dynamism validates the information asymmetry at industry level which afterward affects the

IPO's long-run performance.The empirical findings re-defined the information asymmetry and its impact on IPO's long-run performance in the light of industry level factors. The result strongly validates the divergence of opinion hypothesis in Pakistan.

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