The Impact of Deregulation on Size and Value Premiums in Pakistan Stock Exchange

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Abstract

The emerging markets like Pakistan stock exchange experience high volatility and high return after introducing liberalization policies and deregulation. The paper tries to explore the impact of deregulation on size and value premiums in the Pakistan Stock Exchange (PSX) using daily stock price data of 305 companies from 2004 to 2018 listed at Pakistan Stock Exchange. The main aim is to probe the time-varying behaviour of stock returns after the deregulation in the Pakistan Stock Exchange (PSX). From the policy makers view point, the study is significant to perceive cost-benefit analysis of deregulation and different liberalization policies while contributing in pricing risk in the context of an emerging market of Pakistan. The findings show that various effects including size, value, and market are significant. The GARCH-in-Mean model exhibits significant relation of return and risk. As a result of deregulation, volatility in returns appears persistently significant. The coefficient of the dummy variable appears significant indicating the significant impact of regulatory developments in the PSX. The implications of deregulation in the PSX are to open up the stock market of Pakistan to foreign investors, protecting investors and relaxing regulations for investment, banking/financial as well as non-financial sectors.

Keywords: *volatility, reforms, emerging market, deregulation, institutional development, asset pricing models*

Introduction

The probe of risk premia is rudimentary to explore the efficiency of emerging markets Emerging markets are recognized through specific characteristics including high risk as well as high return. These markets are more volatile and more predictable as compared to developed (financial) markets (Bekaert & Harvey, 1997). Since the emergence of Efficient Market Hypothesis (EMH) in 1980 has provided the theoretical basis for research in finance. During the 1980s, most of the research studies predicted returns through historical common stock prices along with risk premiums including market premium and other premiums such as small minus big (SMB) and high minus low (HML) at firm-level (Fama & French, 1996).

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Many researchers have cantered the behaviour of stock prices. They focused on the relationship of market value and stock returns of the common stock prices, which is known as the size premium. Initially, Banz (1981) documented the size premium. He explained that the firms with low market capitalization earned higher expected returns than they would expect in the case of market portfolio appears mean-variance efficient. In addition, the firm's market equity along with book value is used to calculate its book-to-market (B/M) value. Therefore, institutional development and deregulation/reforms, and technological development are the main sources of achieving efficiency in financial (Lagoarde-Segot & Lucey, 2008).

Generally, reforms in the financial sector or institutional development entail different types of measures including the limited intervention of government particularly controlling interest rate, relaxing control over the portfolio, and credit directedness (Villanueva & Mirakhor, 1990; and Lal, 1985). Deregulation allows for a competitive financial system by minimizing ownership of government towards financial intermediaries, via the provision of novel products to have appeared in the financial sector, and bounding excess burden of taxes imposed by intermediaries and banks (Gelb & Honohan, 1990).

Deregulation cuts down restrictions and limitations faced by domesticated businesses and households with their similitudes pertaining to dealings in financial matters. As anticipated, insurance in the provision of the efficient flow rate of finances to be promised to risk-averse investors along with savers. It also paves the way and supports domesticated borrowers as well as lenders to be effectively and efficiently competed in worldwide financial markets (Caprio et al., 1994). The payoffs or rewards of reforms/deregulation incurred from capital market are considered in form of greater financial tractability of household and firm, better capital market's functional efficiency, lower transaction cost (s), effective (financial) resource allocation along with higher output as well as speedy growth of the economy (Khoury, 1990a). The deregulation in financial market leads to increase in private capital thereby it enhances the growth and size of private firms (Ewens & Farre-Mensa, 2020)

The changes or developments in institutional provisions have their significant role in the reforms of the financial sector of developing economies. The changes in regulatory policies or reforms conduced while diluting the firm's dependency on credit provided by banks and tailored the firm in the direction of financing through equity. However, greater interest of the government in allocating credit, missing competition, lack of efficiency are such characteristics still faced by financial institutions, which appeared as a result of the initial wave of reforms (Cho, 1986; and Isard et al., 1996). Moreover,

changes in economic fundamentals also lead to higher volatility and systematic risk in emerging markets (Karanasos et al., 2021)

Prior to early 2000s, deregulation and various regulatory policies were preceded in the Pakistan Stock Exchange (PSX) as a result, it appeared as the emerging market with high volatility and high returns. According to Nishat (2000) and Hafeez & Nishat (2019), reforms and deregulation have increased the volatility/stochasticity of the financial market of Pakistan that appeared a crucial factor in pricing securities.

The aim of the study is to investigate the impact of deregulation on risk premia. The basic motive behind this study is to explore time variation in size and value premiums. The established hypothesis for firm-level stock return is that whether size and value factors are significantly associated with the excess stock return, thereby, deregulation leads to time variation in risk premia. The organization of the paper has different sections including review literature in section 2, data source and methods in section 3 and results in section 4 following section 5 containing conclusion.

Research Questions

The research questions addressed in this study are as follows:

i. Does deregulation significantly affect size and value premiums?
ii. Does deregulation lead to time variation in risk premiums in the Pakistan stock exchange?

Literature Review

Deregulation

Literature shed light on (financial) deregulation developed by various researchers. According to Shaw (1973) and Mckinnon (1973), theoretically, regulation for both markets (money and financial) imposed by the government discredited the potential of less developed economies to fully stabilize their growth capacity.

Different countries adopted a soft approach including Korea, Japan, UK, Taiwan, and Australia for deregulation and financial liberalization. Deregulation was quite relaxed followed by the stock market of Japan. As a result, institutions enjoyed greater freedom while formulating portfolios, permitted to emerge new stocks in both types (public & private) of equity markets (Sato, 1992).

The policy measures taken by the government of Taiwan were introduced in three different phases since 1986 after allowing foreign investment (Sikoroski, 1996; Kuo, 1990; Chou, 1988; and Haggard & Lee, 1995). The variables related to capital and economic markets changed in order to promote the stock market of Korea. The stock market of Korea got rid of the system of fixed commission and allowed new companies to be entered into equity business (Sikoroski,

1996; Koh, 1992; and Haggard & Lee, 1995). The London Stock Exchange (LSE) showed a greater extent of volatility after (Big Bang, 1986) deregulation (Peel et al., 1993). The decisions regarding deregulation increased the visibility of trading decisions, which led to enhanced price volatility.

The government of Australia deregularized both foreign exchange and financial markets in order to enhance capital flows in form both direct investment and portfolio investment, introducing competition in the economy as well as global (financial) market's (financial) discipline (Brooks & Faff, 1995). The goal is to overcome specific kinds of risk (risk of blockage of fund conversion, etc.) along with getting a better return. Moreover, other measures included adjustment of monetary policy, tightened budgets, and tighter scrutiny for security companies. Therefore, the stock market of Australia recovered during 1988 (Brooks & Faff, 1995; and Henderson, 1995).

Canada deregulated the financial markets to cope with international standards. Banks, insurance, and trust companies are permitted to have security dealers. Consequently, the security industry expanded and appeared as strong and integrated (Khoury, 1990b). Since the reforms of 1983 in Indonesia, the financial sector seemed weak owing to the supervision of institutions belonging to the financial system was very poor. Therefore, credit, banking, and other prudential rules and regulations were declared in 1988 (Sikoroski, 1996; Woo & Nasution, 1989; and The Banker, 1990). The Capital Market Decree (CMD) was introduced in 1990 to build up a suitable structure having up-to-date capital market activities. This decree (CMD) appeared crucial in developing the stock market along with elucidating responsibility and the role of the government (Horikoshi & McColgan, 1996).

Some latest studies also shed light on the issue of volatility faced by various emerging economies that has been experienced after deregulation. These studies highlighted that financial volatility always appeared as a significant feature of financial markets. In addition, stock return volatility played a vital role in managing risk and portfolios, hedging strategies and asset valuation (Hoque & Zaidi, 2020, Li, et al., 2020; and Liang et al., 2021).

Impact of Deregulation on Size and Value Premiums

In this section, the empirical literature on the emerging market of Pakistan regarding the firm-level stock returns after introducing reform/deregulation is reviewed. The deregulation in the stock market of Pakistan started in the late 1980s. Since 1988 different regulatory measures brought in such as divesting public sector's firms to public-privatization, foreign investors were given free (of restrictions) accessibility to the PSX and financial institutions were

denationalized. As expected, the PSX developed with regard to its breadth and depth. Nevertheless, the PSX is still considered an emerging market due to high volatility as well as high returns (Nishat, 1999).

Nishat (2000) explored the relationship between deregulation/reforms and stock returns in PSX between 1980 and 1994. He found a significant upward increase in size and value premiums after deregulation/reforms. The GARCH-in-Mean (GARCH-M) showed a time-varying behaviour of risk premia while indicating a significant relation of risk to return. The return volatility along with persistence in volatility also experienced after deregulation. Moreover, Nishat (2001) exhibited the impact of deregulation/reforms on stock prices at the industry level and proved the established hypothesis which indicated that PSX experienced higher industry risk premia as the financial markets opened up. The relation of higher risk with higher return appeared stronger during the reform period. The industry returns were also marked with higher volatility.

Hafeez & Nishat (2019a) have explored a significant effect of deregulation on size and value premiums in the Pakistan stock exchange in Pakistan from 2004 to 2016. They declared that value, size, and market premiums, as well as return volatility, are found in PSX. In addition, Hafeez & Nishat (2019b) found the impact of reforms/institutional development in predicting daily returns from 2004 through 2018. The research methods include a three-factor model of Fama & French and the chow test to explore policy impact along with the augmented three-factor model to capture time variation in returns of PSX. The findings highlight a significant effect of deregulation and institutional developments on risk premiums and return volatility. These results are similar to those of other emerging markets. Moreover, Hafeez (2019) examined the significant impact of reforms/deregulation along with institutional development on stock return(s) using the data of non-financial companies listed at PSX from 2003 through 2016. The observation shows that PSX experiences higher returns due to frequent and aggressive policy introduction/changes from the period of 2013 through 2016, thereby, stock returns are more predictable after deregulation.

Established Hypotheses

The established null hypotheses are as follows:

H0: There is "no increase in volatility" of stock returns after deregulation in the Pakistan Stock Exchange.

H01: The role of liberalization and regulatory policies are not significant in explaining size and value premiums in the PSX.

Research Design

The stocks related data is collected from the Data Portal of PSX and DataStream. The data of 305 stocks is extracted from listed companies (non- financial firms) of PSX (Pakistan Stock Exchange) from January-2004 to December-2018. 6-month T-bills are used as a proxy for the rate of return of risk-free assets. Various bulletins (Balance Sheet Analysis) of SBP are the source of accounting data.

This study is conducted by taking same number of companies from 2004-2018. In order to avoid thin trading, the sample consist only those companies that have reasonable liquidity (i.e. 90% to 95%). As far as, the selection of dataset is concerned i.e. 2004-2018, the deregulation covered all major institutional developments made in the PSX. These are demutualized and corporatized of PSX in 2012 and integration of three stock exchanges (formerly known as ISE, LSE and KSE) into unified stock exchange i.e. Pakistan stock exchange in 2016 and Chinese consortium has won 40% shares of PSX during 2016 to reduce fragmentation.

Theoretical Models and Empirical Methods

Fama & French (992) proposed a three-factor model to explore size and value premiums in addition to market premium which has been depicted through Capital Asset Pricing Model (CAPM). The CAPM and three-factor model can be expressed in the following way:

$$E(R_i) = R_f + \beta_i\,[E(R_m) - R_f] + \varepsilon_i \qquad (1)$$

Where the sensitivity of stock to market risk is shown by β_i and residual return is represented by ε_i .

$$R_i - R_F = \alpha_i + b_i\,(R_M) - R_F + s_i\,(SMB) + h_i\,(HML) + \varepsilon_i \qquad (2)$$

Where, the variables R_M, *SMB, and HML* are premiums. Factor loadings/sensitivities are represented by b_i, s_i, h_i. α_i represents the intercept and the random return is shown by ε_i.

For analyzing, time variation in risk premia, three factors are incorporated in addition to the risk factor (beta) of CAPM to extend the GARCH-M process. After incorporating premiums (size and value), the GARCH-M framework is as follows:

$$y_t = \gamma_0 + \gamma_1 x_{1t} + \gamma_2 x_{2t} + \gamma_3 x_{3t} + \theta h_t^{1/2} + \mu_t \quad (3)$$

$$\mu_t = \varepsilon_t - \phi\varepsilon_{t-1} \quad (4)$$

$$h_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \varepsilon_{t-1}^2 + \sum_{i=1}^{q} \beta h_{t-1} + \delta D_t \quad (5)$$

y_t indicates the excess return of various portfolios including risk factor, size, and B/M value at time t. RHS explanatory portfolios are shown by x_{1t}, x_{2t}, and x_{3t}. Error term (μ_t) is assumed an moving average, MA (1). A dummy variable (D =1 reforms and deregulation and D=0 for otherwise) in equation (5) is incorporated in the GARCH-M framework to find the impact of deregulation.

Result Discussion

A size premium's existence has been shown after analyzing stock returns of various portfolios ranked through market capitalization (Reinganum, 1981). **The study** used the firm's market equity of last trading day for the month of December of every year in order to measure the size. Firms are ranked on a size basis and ten (10) portfolios have been formed on yearly basis. The economic reason for small forms which are earning higher returns might be as a result of higher leverage and infrequent trade which makes these firms riskier. This is similar to that has been found in other emerging markets (Chan & Chen, 1991). In contrast, small firms have the tendency to earn less profit (Fama & French, 1995). Therefore, large firms are earning higher returns in PSX, this behaviour is not observed in other markets. The reason behind this phenomenon is that multinationals outperform in relation to PSX due to the regular payment of dividends.

Table (1) indicates that size-ranked portfolios have a significant and positive relationship with market premium after the deregulation in PSX. Therefore, market premium appeared higher which is estimated through TFM as compared to CAPM during the period of reforms. Deregulation has a strong impact on size premium. However, the value premium is not affected by deregulation. In addition, the Chow test shows a significant change in returns in reforms and non-reform periods. Overall, size-ranked portfolios have explanatory power from 14% through 90%. Both premiums such as size and value are related to value-weighted returns significantly and positively for portfolios formed on the basis of size. However, a few portfolios are negative but appear significant. Amongst all, market return appears higher. These results are consistent with that of Nishat (2000)

A firm's market equity along with book value is used to calculate its book-to-market (B/M) value taken at the end of the month of December on yearly basis. The firms have been ranked on behalf of B/M portfolios and formulated ten equal value-based portfolios which have been rebalanced yearly. High-value stocks exhibit high returns which are similar to the other emerging markets indicating small firms' effect. For instance, various researchers found that higher expected returns are linked to higher book-to-market (B/M) value (Lakonishok et al., 1994; Capaul et al., 1993; Fama & French, 1992; Chan et al., 1991 and Rosenberg et al., 1985).

However, low B/M portfolios with higher returns appeared in PSX as compared to those portfolios with high B/M. This behaviour of PSX is not consistent with other markets. One of the reasons that have been observed is new floatations. Generally speaking, stock prices remained higher for large/big stocks. Such large/big stocks having low B/M value experience higher returns as a result of payment of regular dividends. The findings also show that the performance of firms with low B/M (growth) is better after deregulation and in the reform period. Most of the portfolios indicate that the value premium for the spread of medium value stocks and low/high-value stocks is greater that of between high value (B/M) and low B/M stocks. The value premium appears higher after deregulation. In most cases, portfolios with low B/M are showing high-risk premia.

Table 3 contains the results of specification tests which indicate that risk premia are not linear, constant, and normally distributed reflecting that they are time-variant. So, this time-varying behaviour is modelled through the ARCH-M framework proposed by Engle (1982). Table 4 shows the findings of GARCH (1, 1)-M process. GARCH (1, 1)-M incorporated dummy variable in order to find out the effect of deregulation and reforms. For small-size portfolios along with low B/M stocks, this variable appears positive and significant indicating an upward shift in these premiums/risk-premia after deregulation and regulatory reforms. On the other hand, risk premia show a decline in the case of large-size portfolios due to the negative but significant impact of deregulation and reforms. Moreover, risk premia increased for high-value portfolios. However, the coefficient for these stocks is not statistically significant. A significant effect of ARCH indicates volatility clustering implying big surprises of each sign (either negative or positive) present in the PSX. α_1 represents the ARCH effect is not more than one (1) indicating unconditional variance for excess holding yield for PSX is not exhibited a fat-tailed distribution. This finding is similar to that of Nishat (2000) and DeSantis & Imrohoroglu (1997) appeared in the perspective of emerging markets. The persistence in volatility is

shown by ($\alpha_1+\beta$) exhibiting a degree of persistence for conditional variance. The effect of non-synchronous trading is shown by β (coefficient of moving average).

The analysis has been extended to explain the stochastic/volatile behaviour of different portfolios (smallest/largest size portfolios and lowest/largest value portfolios). Volatility is experienced in PSX for small-size stocks. The ARCH effect is also found significant after deregulation. Moreover, persistent volatility's coefficient ($\alpha_1+\beta$) has appeared higher after deregulation and reforms i.e. (0.988). On the same line of reasoning, large-size portfolios indicate the same behaviour during and before deregulation. The moving average's coefficient is much higher having the value of 0.924 during the period of reform and deregulation.

However, PSX is evident of risk-return relationship for most of portfolios of small as well as large/big size portfolios. Coefficients of risk-aversion (**θ**) appear significant for the small portfolio with a value of 0.141 and 0.153 for large portfolios after deregulation. The return volatility along with the higher degree of persistence in volatility is experienced for both portfolios (low & High B/M value). The value of coefficient indicating persistence in return volatility is 0.810 for portfolios of low value (B/M). Similarly, high B/M portfolios behave after deregulation. The value of the coefficient of risk aversion is 0.160 for high and 0.390 for low B/M portfolios reflecting the reward to investors for holding stock a day i.e. return for bearing risk.

Table 1

Risk Premiums Size based Portfolios

Portfolios	MRK	t-stat.	Size	t-stat.	Value	t-stat.	R^2-adj.	F-stat.
Small	0.910	21.011	0.812	15.101	0.021	0.309	0.141	4.407*
2	0.904	28.104	0.770	20.704	0.134	4.330	0.210	2.304**
3	0.215	34.041	0.618	25.250	0.909	5.070	0.300	8.120*
4	0.704	46.110	0.652	33.055	0.209	10.506	0.420	7.306*
5	0.640	52.101	0.610	37.020	0.141	11.050	0.508	12.026*
6	0.601	42.650	0.331	16.943	0.206	11.050	0.410	17.042*
7	0.600	42.510	0.321	16.410	0.140	9.404	0.420	16.260*
8	0.702	51.100	0.314	15.106	0.201	13.202	0.540	35.120*
9	0.762	55.433	0.120	7.110	0.154	10.012	0.620	25.190*
Big	0.802	90.014	-0.333	-29.301	-0.308	-31.020	0.901	7.201

F-stat presents results of Chow test before and after deregulation

Table 2

Risk Premiums for Value based Portfolios

Portfolios	MRK	t-stat.	Size	t-stat.	Value	t-stat.	R^2-adj.	F-stat
Low	0.910	14.101	0.502	6.016	0.020	0.305	0.101	7.020*
2	0.504	22.102	-0.433	-14.060	-0.540	-23.400	0.505	21.060*
3	0.804	51.102	-0.301	-12.502	-0.310	-19.088	0.740	26.202*
4	0.852	52.030	-0.161	-3.014	0.105	5.033	0.710	16.110*
5	0.731	41.423	-0.022	-0.808	0.104	5.010	0.541	15.002*
6	0.971	52.102	0.102	2.320	0.207	9.442	0.640	12.210*
7	0.902	44.104	0.045	2.031	0.204	9.103	0.544	27.501*
8	0.910	51.020	0.106	3.031	0.400	22.350	0.644	80.360*
9	0.831	42.103	0.243	9.038	0.420	21.371	0.503	44.370*
High	0.905	35.302	0.610	18.380	0.405	15.504	0.341	38.310*

F-stat presents results of Chow test before and after deregulation

Table 3

Estimates for Specification Tests

Parameters	Small size	Large size	Low B/M	High B/M
α_0	-0.003	-0.050	-0.066	0.010
se(α_0)	0.033	0.010	0.107	0.023
b	0.810	0.801	0.910	0.916
se(b)	0.040	0.010	0.103	0.025
s	0.720	-0.330	0.503	0.610
se(s)	0.050	0.014	0.101	0.034
h	0.014	-0.310	0.020	0.405
se(h)	0.040	0.010	0.103	0.024
R^2-adj	0.141	0.901	0.101	0.341
D.W.	2.142	2.013	2.010	2.050
NONLIN	0.210	9.203*	2.130	0.601
NORM	6192.10*	2210.32*	1920102*	4270.42*

Parameters	Small size	Large size	Low B/M	High B/M
ARCH	72.101*	305.103*	0.810	31.040*
HET	12.110*	14.310*	14.012*	7.410*

Table 4

Estimates for Time Varying Risk Premiums

Parameters	Small size	Large size	Low B/M	High B/M
γ_0	-0.240	-0.110	-1.160	-0.205
γ_1	0.710	0.841	0.704	0.742
γ_2	0.601	-0.280	0.404	0.504
γ_3	0.044	-0.234	-0.101	0.301
θ	0.141	0.153	0.390	0.160
t (θ)	2.240*	2.040**	6.505*	2.605*
α_0	0.102	0.040	3.110	0.014
t(α_0)	9.802*	10.280*	8.701*	5.360*
α_1	0.064	0.093	0.350	0.087
t(α_1)	11.244*	12.510*	5.144*	15.013*
β	0.924	0.860	0.460	0.910
t(β)	142.350*	84.111*	11.033*	182.130*
δ_1	-0.004	-0.004	0.240	0.004
t(δ_1)	-0.240	-1.605	2.802*	0.310
likelihood	-5604.10	-1493.44	-6641.01	-4494.10
Q(12)	15.401	62.030	20.110	44.102
Q^2(12)	7.504	18.060	0.044	20.060

Conclusion

The results exhibit significant market, size, and value effects in the PSX. The time-varying model for risk premium highlights a significant relationship between return and risk. The volatility in the expected returns of all types of stocks is highly significant. The persistence in volatility along with the non-synchronous trading effect is also evident in the PSX. This is similar to that of Nishat (2000) and Hafeez & Nishat (2019). The coefficient of the dummy variable appears significant indicating the significant impact of regulatory developments in the PSX. This research paper is useful for portfolio managers, financial & security analysts, and investors. The findings reflect that investors and portfolio managers could be benefited by using these premiums (size & value) in their investment strategies. Time varying risk premia imply that stakeholders and researchers may take into account the time variation

in risk premia in their various analyses and probing in the long term. Moreover, the Chow test highlights that deregulation significantly affects various premiums and the findings are coherent with the behaviour of emerging markets.

Limitation and Further Research

Although, this study is considered a comprehensive examination of the impact of deregulation on size and value premiums in the Pakistan stock exchange, however, the study has some limitations. Such as non-availability of a suitable measure of risk free for T-bills, 6-month Treasury bond has less variation as compared to T-bills returns. Further research is needed to decompose the different sources of volatility in relation to macroeconomic as well as micro-structural variable(s) while explaining the variation in risk premiums.

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