



IS DEMUTUALIZATION A PANACEA TO SPUR INVESTORS' PERCEPTION?

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Abstract

This study considers demutualization of Pakistan Stock Exchange (PSX) and how it has influenced investors perception. The investors perception and response to demutualization is assessed under two heads namely: volume of trade as proxy for liquidity, and market price as proxy for volatility. The study is layered into: country level and firm level. Pakistan used to have three stock exchanges namely: Karachi Stock Exchange, Lahore Stock Exchange and Islamabad Stock Exchange. Following passing of the Demutualization Act in the year 2012, these three stock exchanges merged to form a single stock exchange named as Pakistan Stock Exchange abbreviated as PSX. The investors perception as reflected in the number of trades is assessed against country's gross domestic product to measure demutualization impact on investment climate that prevailed in the country during the period 2014 to 2018 which is two years before and two years after demutualization. The year 2016 is the year when the process of demutualization was given final shape and being transitory period is ignored for the study. The explanatory variables used for the study include: turnover ratio, market capitalization, value of trades as percentage of GDP, and the control variables include size and age of firms included in the study. The study has revealed that Demutualization of PSX has had statistically significant impact on liquidity and volatility.

Keywords: Demutualization, Stock Exchange, Investments, Price Volatility.

INTRODUCTION

A significantly dominant role is played by stock exchanges in the economy of a country. It is an indicator of investment climate in any country. Investments depend on the savings potential that peoples in a country possess which in turn depends on three things: income in the hands of the investors, cost of living, and inflation prevailing in the country. The other relevant criteria for investments is trust and confidence of the peoples on the mechanism that exists for exchange of securities and stock exchanges provide this platform. However, traditionally stock exchanges were manned by a few strong stock brokers who swayed the market to meet their ulterior motives with little concern for the investors who placed their hard earned savings in the stocks of firms. Some other characteristics of this phenomenon included information asymmetry and insider trading. This was the reason that the size of the stock exchanges was limited due potential investors skepticism concerning integrity of the top echelon at the exchanges. Against the backdrop of this gloomy scenario was the magnificent strides that telecommunication industry was making to boost communication throughout the world. The fiber-optic technology and internet completely transformed communication making available platforms armed with accurate and timely information where on-line trading was feasible. The traditional stock exchanges fearing loss of traffic and to gain investor trust decided to corporatize which eventually resulted in demutualization of mutual type exchanges. The concept of demutualization spread like bushfire and large number of mutual exchanges all over the world converted into demutualized member owned stock exchanges. Pakistan has been no exception. Pakistan traditionally had three stock exchanges namely: Karachi Stock Exchange, Lahore Stock Exchange, and Islamabad Stock Exchange. With the passing of the Demutualization Act in the year 2012 these three stock exchanges were merged into one single stock exchange named Pakistan Stock Exchange abbreviated as PSX. The process of demutualization of PSX was completed in the year 2016 when 30 percent shares were sold to a Chinese consortium comprising: China Financial Futures Exchange Company Limited (lead bidder), Shanghai Stock Exchange, and



Shenzhen Stock Exchange. The Chinese consortium was the highest bidder at Rs.28 per share for 320 million shares worth Rs.8.96 billion which was equal to US\$85 million. Another 10 percent shares were sold to two local financial institutions namely: Pak-China Investment Company Limited and Habib Bank Limited (5% shares each). As part of divestment process 20 percent shares were sold to public. KPMG recommended reference price was Rs.26 per share. The members of the stock exchange were issued Trading Rights Entitlement Certificates (TREC) and also shares in PSX (40 percent shares) thus separating trading rights from ownership rights. The Securities and Exchange Commission of Pakistan (SECP) is the apex regulator of PSX. Currently PSX is listed at its own stock exchange. Trading activity is conducted under several indices notably KSE-100 Index (started in 1991) and representing 85% of all market capitalization computed using Free Float methodology. **McKinsey (2018)** considered Asian stock markets generating fast economic growth and splendid equity returns. **Irtiza et al (2021)** made a comment about the superior performance of PSX in the wake of climate change, constant war on terror, and pandemic. **Tauseef and Dupuy (2022)** lamented that PSX has not gained substantial world recognition in spite of superior returns advantages and diversified risk potentials. **Mangi (2020)** made a case for foreign direct investments in PSX by saying that “Pakistan is the hot Asian stock market hungry for foreign cash”. PSX obtained ranking among ten ‘Best Performing’ world markets during 2012-2014 from Bloomberg. Further in the year 2016 Bloomberg ranked PSX as world’s ‘Best Performing’ market and Asia’s ‘Best Market’. **Mangi (2020)** described PSX as promising market for investments for domestic investors as well as for foreign investors.

LITERATURE REVIEW

Attempts have been made by researchers to critically review and compare performance of stock exchanges in the pre and past demutualization era. Some notable research include **Akhtar (2002)**, **Nayangara and Maziviona (2014)**, **Krishnamurti et al (2003)**, and **Morsy (2007)** who examined performance based measures such as accounting and liquidity, return based measures, risk based measures and economic variables to assess stock exchange performance in the post-demutualization era. They used measures such as return on assets (ROA), return on equity (ROE), asset turnover and financial leverage to prove that demutualization added value to the bourses. **Mawardi et al (2021)** explored the millennial investors index preferences and discovered long term preferences for profit by investors in Indonesia’s capital market. **Khan et al (2021)** examined heuristic biases effect on investments and identified positive and significant impact of “availability bias” and “representativeness bias” on investments decision-making. **Dhungana (2022)** contended that psychological decision-making principles influence buying and selling activity at investment markets. They attempted to measure the effect of cognitive biases on decision-making relating to investments at capital markets. They found strong influence of irrationality in decision-making particularly overconfidence and recommended de-biasing to eradicate biases in decision-making. **Akhtar (2001)** emphasized that regulation of securities markets is critical to ensure efficiency, integrity and fairness of the markets that together lend credibility to markets and safeguard investor interest and confidence. To achieve this, regulators have to perform adequate oversight of exchanges in order to deal with conflict of interest between owners of exchange and the business they offer, rules governing primary and secondary market trading, ethical practices of market participants, investor protection and transparency of market transactions. **Morck et al (1980)** considered stock market’s deviant behavior by evaluating stock markets large and independent impact on investors by using aggregate and firm level data to identify whether stock markets direct investment or it is a sideshow. Their statistical analysis did not support the notion of any long-term influences of bourses in guiding long-term investments. They found that stock markets provide sunspot and influence investment decisions. **Hughes (2001)** highlighted the views of critics of demutualization who argue that the process simply serves to substitute one interest group to another. He further stated that broker-dealers and later retail investors would be shareholders of exchanges and wish to pursue profit maximization goals that may not be consistent with regulatory steps that impose burdensome listing requirements on issuers, and drive brokers or dealers to execute their trades elsewhere. **Akhtar (2001)** argued that demutualization should not be confused as a panacea for poor self-regulation by an



existing bourse without the new owners' commitment to consistent and effective self-regulation. She further stressed that without this commitment the regulatory benefits of demutualization could be illusory. **Islam & Islam (2011)** highlighted factors leading to the wave of demutualization including fast changing market place, growth in number of trades and investment in technology. **Aggarwal (2002)** pointed out the regulatory issues resulting from self-regulation of stock exchanges. In this connection he raised concern regarding conflict of interest between business operations and regulatory obligations. **Flekner (2005)** stated that demutualization has increased competition, technological advances and globalization with the result that the organization of stock exchanges is at a crossroads. **Serifsoy (2007)** opined that although demutualized exchanges portray technical efficiency, they perform poorly in terms of productivity growth. **Akhtar (2001)** advised the need to distill lessons from the rapidly evolving experience with demutualization and synthesize both the normative and positive aspects of this exciting and relatively new structure so that developing countries can take advantage of it. **Polk (2009)** pointed out that managers with short-horizons tend to misallocate firm resources thus distort investment decisions. **Morck, Shleifer, and Vishny (1990)** focused investor sentiments, which cannot be justified rationally, affecting stock prices and hold the view that noise in stock prices cause distortionary impact on investments.

SIGNIFICANCE OF STUDY

A review of literature available on the subject of demutualization of stock exchanges is mainly conceptual. Some researchers have attempted to study the post-demutualization financial performance of stock exchanges. Very little research has been done in Pakistan on the topic of demutualization of stock exchanges. This study is the first that examines the post-demutualization effects on volume of trade and volatility of stock prices at PSX. The obvious limitation of the study has been the short time-frame since demutualization of PSX.

THEORETICAL FRAMEWORK

Some well-known and internationally recognized theories have been reviewed which provide support to this study comprising 'Behavior Theory', 'Signaling Theory', 'Property Rights Theory', 'Trade-off Theory', and 'Pecking Order Theory'. Several researchers have attempted to examine investors' behavior at the bourses and tried to establish any connection with 'group influence' or 'herding'. A relevant study by **Ghosh et al (2018)** examined predictability and herding of bourses volatility by pointing to "stochastic oscillators generated financial Reynolds number" and explored its ability to "predict explosions in the bourses and spot herd behavior." Behavior theory defined by **Cherry (2018)** as "theory of learning based on the idea that all behavior is acquired through conditioning. Conditioning occurs through interaction with the environment. Behaviorists believe that our responses to environmental stimuli shape our actions."

Stock markets the world over strive to attract investors to trade on their platform. At the same time retaining the loyalty of stockholders is important. To achieve these objectives, stock markets attempt to provide factual and relevant information called 'signals' to their existing and prospective clientele. Michael Spence presented Signaling Theory in 1974 and prophesied it will eradicate information asymmetry hitherto cause of market failure. **Bloch (2017)** stressed that "asymmetric information in itself is a source of in-efficiency, it is the fundamental market failure." Signaling enables potential investors to take note of various signals prevailing in the market before initiating trading positions. Post-demutualization liquidity and investment in technology enables bourses to provide factual, updated, and transparent information enabling sound strategic decision making by the investors.

Demutualization opened the doors for alliances both within the country and overseas. The relevant issues that cropped up include rights to property (or good) and many researchers delved to interpret it while several offered analysis culminating in the development of 'property rights theory'. The economics context of property is ownership and control over a resource or good. The property rights theory encompasses right to generate income, transferability, and enforcement of rights to property. **Kim and Mahoney (2002)** analyzed property rights theory and attempted to connect it with transaction

cost theory and agency theory. It pointed out that this connectivity forges “residual control rights to match residual rights to income in conceptualizing ownership.” It was concluded that property rights theory provides the theoretical portal where transaction costs theory and agency theory get grounded. It enhances understanding of shared ownership very common in bourses today.

Alkhatib (2012) has also referred to the two time old theories namely Trade-off Theory and Pecking Order Theory. He defines the trade-off theory as “a firm selects how much debt finance and equity finance it needs to employ by evaluating the costs and benefits of each type of finance”. **Myers (1984)** advocated that firms should follow “optional leverage strategy and must aim at a level of debt to value, such level depends on establishing a balance between debt tax shields and costs of bankruptcy”. Corporatization of bourses enhanced their credibility and opened new portals to raise debt finance. In the same context the Capital Structure Theory further reinforces the significance of strategic decision making when it comes to designing capital structure.

The Pecking Order theory stipulates that firms first preference in capital structure decisions is to use internally generated cash followed by external borrowing and finally equity financing. **Chen and Chen (2011)** stress “the Pecking Order theory holds that highly profitable corporations are not over-dependent on external funds, and thus profitability has a significantly negative influence on leverage”. However, when the leverage increases both agency and bankruptcy costs increase rapidly as a result”. **Myers (1984)** contention is that “pecking order theory is when firms favor internal to external funding and if external funding is followed then debt funding is used rather than equity”. **Myers and Majluf (1984)** stress “when share prices are over-valued, then the management is forced to raise funds through equity issues at discounted rates rather than internally funded or debt financing”. They continued to point out that “managers have an insider information advantage and according to the pecking order theory large firms are more likely to have low asymmetric information making new equity issues more appealing to new interested investors”. The relevance of the Pecking Order Theory to the proposed study is where bourses have to decide the mix of debt \ equity in their capital structure.

Business organizations, like any other organization, have to procure various resources from among the environment where they are located. This means that organizations cannot function smoothly in isolation. Essentially organizations depend a great deal on external resources be it customers, vendors, contract structure, capital, and/or board members. **Pfeffer and Salancik (1978)** presented resource dependence perspective and stated “resources are a basis of power.” It pointed out “power and resource dependence are directly linked.” It further went on “power is thus relational, situational and potentially mutual.” A natural progression of the Resource Dependence Theory is that organizations tend to “adopt countervailing strategies” such as integration, diversification, and alliances. The relevance of the Resource Dependence Theory to the proposed study is that demutualization has enabled bourses to enter in alliances, to introduce range of products and services, to broaden investors’ base, and to eliminate asymmetric information floating around in the market.

RESEARCH METHODOLOGY

This study is based mainly on secondary data obtained from official website of companies, Opendoors.com, and PSX. Approximately 53,800 daily records of 40 listed companies of PSX have been examined in the study. The daily volume traded for each company is multiplied with the market price to obtain total value of volume traded. The total value of volume traded is summed up for a year and the total is divided by company’s market capitalization and multiplied by 100 to obtain turnover ratio which is an explanatory variable in the study. Out of the various dimensions of demutualization discussed in the academic articles only those which were found relevant to this study were considered. The dependent variables considered in the study are: Volume of Trades (VT) and standard deviation of market prices (STDDEV) as proxy for volatility. The explanatory variables selected for this study included: market capitalization, return on equity, financial leverage, KSE-100 Index, foreign direct investment, and control variables: age and size of companies. The relevant secondary data relating to these variables was obtained from the websites of PSX, Opendoors.com, and State Bank of Pakistan, and finally from the official websites of companies. The time-frame selected for this study was four years starting from 2014 and going up to 2018. The year of completion of demutualization process i.e. 2016 has been excluded from the study since it is considered transition period. Natural log has been used throughout. The data is analyzed using statistical software SPSS ver 22.. The results of the statistical analysis are reported under the discussion and conclusion heading.

Schematic Diagram - 1





Market Capitalization
Turnover Ratio

Return on Equity

Market Price % of Book Value

Control
Firm Size

Fig. 1
Source: Author's own presentation

Schematic Diagram - 2

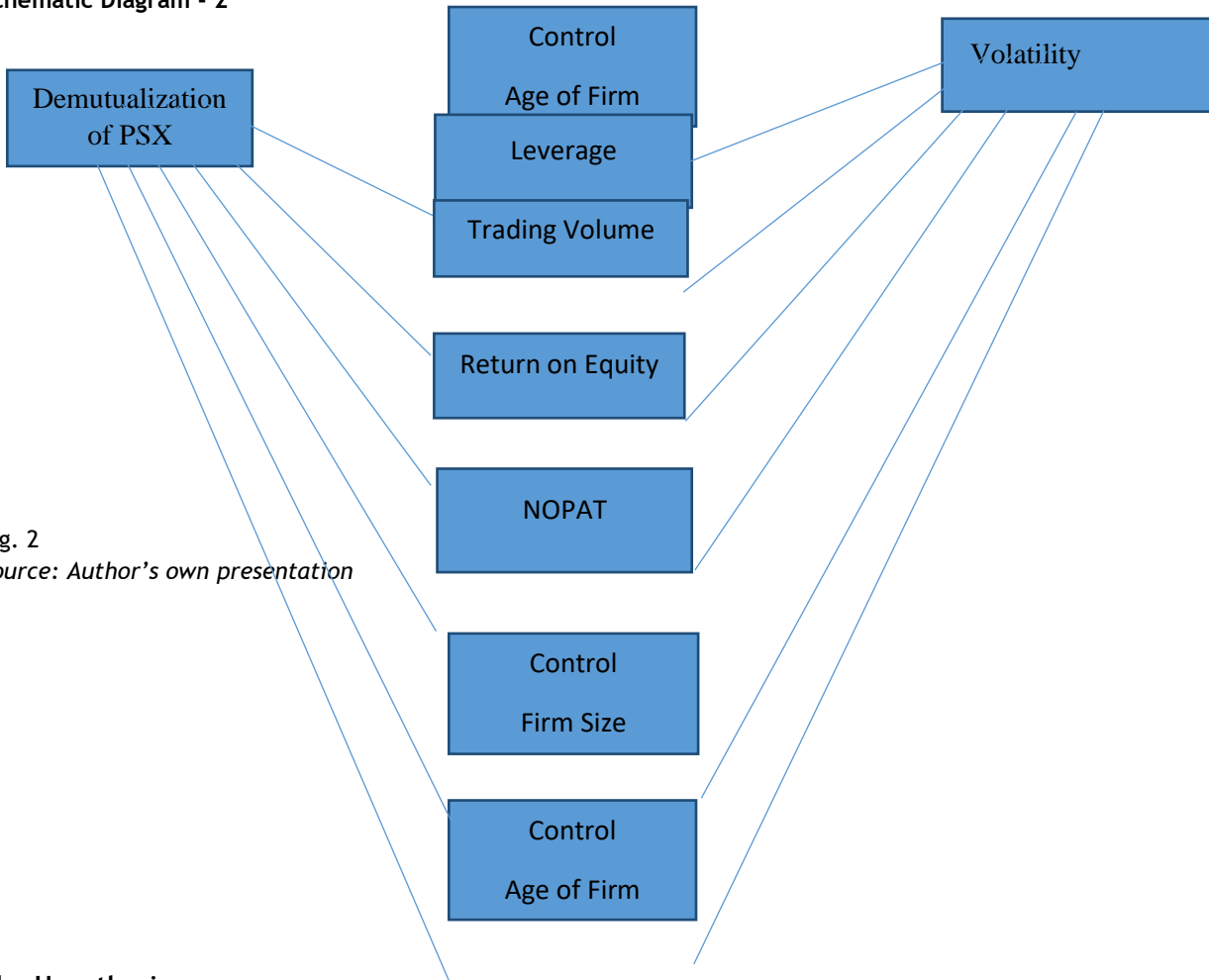


Fig. 2
Source: Author's own presentation

The Hypothesis

The hypothesis used for the study is given below:

Hypothesis - 1**Null hypothesis (H₀):**

There is negative effect of demutualization on volume traded at PSX.

Alternative hypothesis (H₁):

There is a positive effect of demutualization on volume traded at PSX.

Hypothesis - 2**Null hypothesis (H₀):**

There is negative effect of demutualization on volatility at PSX.

Alternative hypothesis (H₁):

There is a positive effect of demutualization on volatility at PSX.

The Model

To encompass the dependent variable and independent variables the study presents the following model

Model - 1:

$$VT_{it} = \alpha + B1 MC_{it} + B2 TR_{it} + B3 ROE_{it} + B4 MBR_{it} + B5 SIZE_{it} + B6 AGE_{it} + \epsilon_{it}$$

Where: MC: Market Capitalization, TR: Turnover Ratio, ROE: Return on Equity, MBR: Market Price % of Book Value, Controls: SIZE and AGE, ϵ : Error Term

Model - 2:

$$SD_{it} = \alpha + B1 LEV_{it} + B2 VT_{it} + B3 ROE_{it} + B4 NOPAT_{it} + B5 SIZE_{it} + B6 AGE_{it} + \epsilon_{it}$$

Where: SD: Standard Deviation as proxy for Volatility, LEV: Leverage, ROE: Return on Equity, NOPAT: Net Operating Profit After Tax, Controls: SIZE and AGE, ϵ : Error Term

Data and Sample Description

The study aims to provide empirical evidence of the impact of demutualization on volume of trades, as proxy for measuring liquidity, and standard deviation, as proxy for volatility, in Pakistan Stock Exchange (PSX) and with this objective in mind the period selected for the study is four years (2014-2018). The year 2016 is ignored being transition period. The data relating to the selected variables was obtained from the official websites of Pakistan Stock Exchange (PSX) and Opendoors.pk. Natural log has been used wherever considered necessary to enable statistical analysis feasible. The data was initially entered in Excel worksheets and thereafter uploaded into statistical software SPSS ver. 22 to obtain Descriptive Statistics, Correlation Matrix, Coefficients, and other relevant statistical results.

Table 1
Measurement of Variable

| Variable | Proxy | Measurement/ Source |
|-----------------------|--|---|
| Liquidity | Trading volume | Secondary data, Opendoors.com.pk |
| Market Capitalization | Aggregate market value of stocks outstanding | Shares outstanding multiplied by market price of one share. PSX websites. |
| Turnover Ratio | Value of volume traded as % of market capitalization | Opendoors.com.pk |
| Return on Equity | Net Operating Profit After Tax as % of equity | Secondary data from website of companies |
| Company value | Market to Book Ratio | Companies financial statements |
| Financial Leverage | Proportion of debt in relation to equity | Companies websites |
| Volatility | Standard Deviation | Square root of variance of |



| | | |
|-------------------|----------------------|---------------------------------|
| | | Market prices of shares. |
| NOPAT | Net Income | Financial statements |
| Valuation of firm | Market to Book Ratio | Opendoors.com and firm websites |

DESCRIPTION OF VARIABLES

Liquidity of Stock Market

Proxy: VT

Volume of Trades refers to the number of transactions in the stocks taking place in real-time and uploaded on-line to achieve maximum transparency and to avoid information asymmetry. It is consistent with research conducted by Garcia and Liu (1999), Sarr and Lybek (2002).

MC and Market Liquidity

Market Capitalization is an indicator of growth in the bourses and represents aggregate market value of stocks of companies listed in bourses. The relevant secondary data was collected from the websites of the companies. The variable is consistent with research conducted by Morsy (2007), Abukari (2015), and Khatun (2018).

TR and Market Liquidity

Turnover Ratio has been used by contemporary researchers as one of the significant indicator of stock market performance of firms. The turnover ratio in respect to a listed stock measures trading activity in relation to the total market capitalization of the listed stock. The ratio has been used by: Otchere (2008), Yartey (2007), Levine (1998), Garcia and Liu (1999), and Yartey (2008).

ROE and Market Liquidity

Return on Equity (ROE) is a measure of profitability of a company and a relevant factor in investors' decision making. The secondary data is obtained from the websites of companies. The variable has previously been used by Berzkalne and Zelgalve (2014), Al-Qudah (2016).

MBR and Market Liquidity

The ratio of market price of a stock to its book value is an indicator as to how market values a firm. A firm can be undervalued or overvalued in the stock market and investors are keen to consider this ratio before making any decision. The variable is consistent with previous research by Chen (2006), Khan (2009), and Sharma et al (2013).

LEV and Market Liquidity

Introduction of debt in the capital structure leads to lower overall cost of capital while at the same time increase profitability and credibility of a company. An important factor in decision making. The secondary data is obtained from the websites of companies. The variable has been referred previously by Bei (2012), Javed (2015), and Rabbani et al (2015).

Volatility

Proxy: SD

A significant indicator of level of risk and volatility attached to a business is standard deviation. Investors generally consider the risk of business before decision making. The variable has been used previously by Barde and Barde (2012), Omda and Sergent (2022).

VT and Volatility

The volume of trade indicates the total number of shares exchanged between buyers and sellers during the official trading hours on any particular day. It is a significant indicator of stock market liquidity. The variable is consistent with research performed by Morsy (2007), and Abukari (2015). The secondary data to be collected from websites of bourses, Bloomberg, World Federation of Exchanges (WFE), and Capital IQ.

NOPAT and Volatility



NOPAT is closely related to volatility and it is frequently used by researchers in forecasting volatility of stocks as well as option prices. The variable is consistent with research conducted by: Li and Nissim (2014), Uyemura (1996), Mauboussin (2014).

FINDINGS AND DISCUSSION

The relevant secondary data has been analyzed using statistical software SPSS version 22. The tests are aimed to establish any significant variations in the characteristics of the sample following demutualization of PSX. The results of the analysis are given below:

Table 2
Liquidity - Descriptive Statistics Before Demutualization

| | N | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
|--------------------|-----------|-----------|-----------|-----------|----------------|-----------|------------|-----------|------------|
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| ln vt | 80 | -4.61 | 6.96 | 1.6660 | 2.59061 | -.240 | .269 | .003 | .532 |
| ln mc | 80 | 2.94 | 12.93 | 7.8180 | 2.20981 | .147 | .269 | -.108 | .532 |
| ln tr | 80 | -4.61 | 6.20 | 2.5319 | 2.24984 | -1.204 | .269 | 1.351 | .532 |
| ln roe | 80 | 0.00 | 5.01 | 2.0715 | 1.48231 | -.251 | .269 | -1.224 | .532 |
| ln mbr | 80 | -1.77 | 6.11 | 1.6041 | 1.98718 | .583 | .269 | -.737 | .532 |
| size | 80 | 0.00 | 10.86 | 6.5595 | 2.48256 | -.712 | .269 | -.058 | .532 |
| age | 80 | 3.00 | 81.00 | 35.7500 | 17.91789 | .746 | .269 | -.252 | .532 |
| Valid N (listwise) | 80 | | | | | | | | |

Table 3
Liquidity - Descriptive Statistics After Demutualization

| | N | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
|--------------------|-----------|-----------|-----------|-----------|----------------|-----------|------------|-----------|------------|
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| ln vt | 80 | -4.61 | 7.70 | 1.2106 | 2.69959 | .033 | .269 | .292 | .532 |
| ln mc | 80 | 2.94 | 13.16 | 7.9464 | 2.20281 | .196 | .269 | -.101 | .532 |
| ln tr | 80 | -4.61 | 6.29 | 1.9329 | 2.42694 | -.666 | .269 | .620 | .532 |
| ln roe | 80 | -1.77 | 5.76 | 2.0026 | 1.54931 | .081 | .269 | -.214 | .532 |
| ln mbr | 80 | -1.61 | 5.53 | .9136 | 1.84489 | 1.101 | .269 | .389 | .532 |
| size | 80 | 2.60 | 11.02 | 6.9636 | 2.19564 | -.283 | .269 | -1.106 | .532 |
| age | 80 | 6.00 | 84.00 | 38.7500 | 17.91789 | .746 | .269 | -.252 | .532 |
| Valid N (listwise) | 80 | | | | | | | | |



Table 2 and 3 summarizes the descriptive statistics for the samples drawn before demutualization and after demutualization. The mean and standard deviation for VT are in the order of 1.666 and 2.59061 during the pre-demutualization period (2014-2015) and in the order of 1.2106 and 2.69959 in the post-demutualization period (2017-2018). [Ref]As for MC, the mean is 7.8180 and standard deviation 2.20981 before demutualization and the mean is 7.9464 and standard deviation 2.20281 after demutualization. The positive improvement is similar to the study conducted by **Ihsan (2018)**; **Karmel (2002)**; **Islam and Hossain (2015)**; **Morsy and Rwegasira (2015)**; which confirm improvement in market capitalization in post-demutualization period. The post-demutualization statistic indicates slight improvement over pre-demutualization period. The mean and (standard deviation) before demutualization for TR is 2.5319 (2.24984) while it is 1.9329 (2.42694) in post-demutualization period. The statistic indicates slight fall in the post-demutualization period. The pre-demutualization mean (standard deviation) for 'ROE' is 2.0715 (1.48231) while post-demutualization mean (standard deviation) is 2.0026 (1.54931) indicating slight fall. The statistic for MBR is mean 1.6041 and standard deviation 1.98718 in pre-demutualization period and mean 0.9136, standard deviation 1.84489 in post-demutualization period showing slight fall. The pre-demutualization statistic for SIZE is mean 6.5595 standard deviation 2.48256 and post-demutualization statistic is mean 6.9636 while standard deviation is 2.19564 reflecting slightly reduced risk in post-demutualization period. Skewness test is performed to assess the degree of asymmetrical deviation of dataset from symmetrical bell curved normal distribution in order to know the direction of outliers. The skewness test revealed that MBR is right skewed while TR, and SIZE are left skewed. A statistical measure that is used to describe risk of volatility in a dataset is known as Kurtosis. It describes the data that resides in the tails when plotted as a curve. The Kurtosis measure indicated that MC and ROE are platykurtik.

Table 4
Model Summary Before Demutualization

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|---------------|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change | |
| 1 | .866 ^a | .750 | .730 | 1.34719 | .750 | 36.521 | 6 | 73 | .000 | .913 |

Table 5
Liquidity - Model Summary After Demutualization

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|---------------|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change | |
| 1 | .874 ^a | .764 | .745 | 1.36377 | .764 | 39.426 | 6 | 73 | .000 | 1.565 |

A goodness-of-fit measure for linear regression models is R-squared indicating variation in the dependent variable explained by independent variables collectively. Table 5 shows R-squared after demutualization at .764 meaning 76.4 percent of the variation in the dependent variable can be predicted from



independent variables collectively. The result of Durbin-Watson autocorrelation test shows 1.565 in the post demutualization period indicating positive autocorrelation.

Table 6

Liquidity- Coefficients Before Demutualization

| Model | Unstandardized Coefficients | Std. Error | Standardized Coefficients | t | Sig. | Correlations | | | Collinearity Statistics | Tolerance | VIF |
|--------------|-----------------------------|------------|---------------------------|--------|------|--------------|---------|-------|-------------------------|-----------|-----|
| | B | | Beta | | | Zero-order | Partial | Part | | | |
| 1 (Constant) | -3.035 | .903 | | -3.360 | .001 | | | | | | |
| ln mc | .555 | .083 | .473 | 6.698 | .000 | .065 | .617 | .392 | .686 | 1.459 | |
| ln tr | .983 | .081 | .853 | 12.132 | .000 | .705 | .818 | .710 | .692 | 1.446 | |
| ln roe | -.299 | .117 | -.171 | -2.547 | .013 | -.073 | -.286 | -.149 | .760 | 1.315 | |
| ln mbr | -.053 | .085 | -.041 | -.627 | .533 | -.228 | -.073 | -.037 | .799 | 1.251 | |
| size | .003 | .065 | .003 | .043 | .966 | .248 | .005 | .003 | .879 | 1.138 | |
| age | -.040 | .009 | -.278 | -4.323 | .000 | -.343 | -.451 | -.253 | .825 | 1.212 | |

Table 7

Liquidity - Coefficients After Demutualization

| Model | Unstandardized Coefficients | Std. Error | Standardized Coefficients | t | Sig. | Correlations | | | Collinearity Statistics | Tolerance | VIF |
|--------------|-----------------------------|------------|---------------------------|--------|------|--------------|---------|-------|-------------------------|-----------|-----|
| | B | | Beta | | | Zero-order | Partial | Part | | | |
| 1 (Constant) | -3.338 | .923 | | -3.619 | .001 | | | | | | |
| ln mc | .488 | .087 | .398 | 5.585 | .000 | .039 | .547 | .317 | .636 | 1.572 | |
| ln tr | .813 | .069 | .731 | 11.802 | .000 | .758 | .810 | .671 | .842 | 1.188 | |
| ln roe | -.455 | .128 | -.261 | -3.554 | .001 | -.263 | -.384 | -.202 | .599 | 1.669 | |
| ln mbr | -.115 | .089 | -.078 | -1.288 | .202 | -.109 | -.149 | -.073 | .870 | 1.150 | |
| size | .168 | .078 | .137 | 2.152 | .035 | .386 | .244 | .122 | .797 | 1.254 | |
| age | -.027 | .010 | -.181 | -2.850 | .006 | -.355 | -.316 | -.162 | .802 | 1.247 | |

To consider how much variation in the dependent variable is caused by independent variables used in the model and also to ascertain if the model is a good fit, I resort to multivariate linear regression



analysis. However, it is important to establish if the dataset meets the assumptions of OLS regression in order to avoid spurious output. By comparing the results of linear regression before and after demutualization, as reported in Table 6 and Table 7, I form an opinion as to whether there has been a positive impact on the stock market liquidity and volatility climate following demutualization of PSX. The coefficients, as shown in Table 6 and 7, show generally mixed performance overall. The post-demutualization MC at .398(standardized) shows decline over pre-demutualization MC at .473 (standardized). The TR at .731 in the post-demutualization period indicates decline. The ROE at -.261 in the post-demutualization period indicates decline over pre-demutualization period (-.041). The post-demutualization MBR at -.078 reflects decline from -.041 in pre-demutualization period. SIZE at .137 in post-demutualization period indicates improvement over pre-demutualization period .003. AGE at -.181 in post-demutualization period reflects improvement over pre-demutualization -.278. The t-values in post-demutualization period indicate mixed results with MC, TR, and SIZE indicating positive results while ROE, NBR, and AGE showing negative values. The p-values are significant for the variables: MC, TR, ROE, SIZE and AGE while insignificant for the variable: MBR. The significance test at 95 percent confidence level shows generally statistically significant results in post-demutualization period. The VIF values are generally less than 3 indicating low correlation among variables.

Table 8

Liquidity - Correlation Before Demutualization

| | ln vt | ln mc | ln tr | ln roe | ln mbr | size | age | |
|---------------------|--------|-------|-------|--------|--------|-------|-------|-------|
| Pearson Correlation | ln vt | 1.000 | .065 | .705 | -.073 | -.228 | .248 | -.343 |
| | ln mc | .065 | 1.000 | -.383 | .345 | -.012 | .120 | .085 |
| | ln tr | .705 | -.383 | 1.000 | .009 | -.330 | .122 | -.074 |
| | ln roe | -.073 | .345 | .009 | 1.000 | -.227 | -.092 | .296 |
| | ln mbr | -.228 | -.012 | -.330 | -.227 | 1.000 | .010 | -.221 |
| | size | .248 | .120 | .122 | -.092 | .010 | 1.000 | -.248 |
| | age | -.343 | .085 | -.074 | .296 | -.221 | -.248 | 1.000 |

Table 8 represents results for correlation among explanatory variables affecting VT before demutualization. Table 8 shows that values for VT correlate positively with the explanatory variables MC, TR, and SIZE while VT correlate negatively with explanatory variables ROE, MBR and AGE.

Table 9

Liquidity - Correlation After Demutualization

| | ln vt | ln mc | ln tr | ln roe | ln mbr | size | age | |
|---------------------|--------|-------|-------|--------|--------|-------|------|-------|
| Pearson Correlation | ln vt | 1.000 | .039 | .758 | -.263 | -.109 | .386 | -.355 |
| | ln mc | .039 | 1.000 | -.250 | .560 | .326 | .080 | .084 |
| | ln tr | .758 | -.250 | 1.000 | -.223 | -.132 | .259 | -.125 |
| | ln roe | -.263 | .560 | -.223 | 1.000 | .285 | .081 | .281 |
| | ln | -.109 | .326 | -.132 | .285 | 1.000 | .094 | .010 |



| | | | | | | | |
|------|-------|------|-------|------|------|-------|-------|
| mbr | | | | | | | |
| size | .386 | .080 | .259 | .081 | .094 | 1.000 | -.311 |
| age | -.355 | .084 | -.125 | .281 | .010 | -.311 | 1.000 |

Table 9 represents results for correlation among explanatory variables affecting VT after demutualization. Table 9 shows that values for VT correlate negatively with ROE (-.263), MBR (-.109), and AGE (-.355) while VT correlate positively with MC (.039), TR (.758), and SIZE (.386).

Table 10
Volatility - Descriptive Statistics Before Demutualization

| | N | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
|--------------------|-----------|-----------|-----------|-----------|----------------|-----------|------------|-----------|------------|
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| ln sd | 80 | -2.53 | 7.64 | 1.5855 | 2.33172 | .354 | .269 | -.265 | .532 |
| ln lev | 80 | -4.61 | 5.69 | .2080 | 2.33227 | .362 | .269 | .076 | .532 |
| ln vt | 80 | -4.61 | 6.96 | 1.6660 | 2.59061 | -.240 | .269 | .003 | .532 |
| ln roe | 80 | 0.00 | 5.01 | 2.0715 | 1.48231 | -.251 | .269 | -1.224 | .532 |
| ln nopat | 80 | 0.00 | 9.43 | 4.2155 | 3.01957 | -.272 | .269 | -1.231 | .532 |
| size | 80 | 0.00 | 10.86 | 6.5595 | 2.48256 | -.712 | .269 | -.058 | .532 |
| age | 80 | 3.00 | 81.00 | 35.7500 | 17.91789 | .746 | .269 | -.252 | .532 |
| Valid N (listwise) | 80 | | | | | | | | |

Table 11
Volatility - Descriptive Statistics After Demutualization

| | N | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
|--------------------|-----------|-----------|-----------|-----------|----------------|-----------|------------|-----------|------------|
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| ln sd | 80 | -2.66 | 5.48 | 1.3185 | 2.14380 | .023 | .269 | -.939 | .532 |
| ln lev | 80 | -4.61 | 5.08 | -.6994 | 1.72365 | -.006 | .269 | 1.678 | .532 |
| ln vt | 80 | -4.61 | 7.70 | 1.2106 | 2.69959 | .033 | .269 | .292 | .532 |
| ln roe | 80 | -1.77 | 5.76 | 2.0026 | 1.54931 | .081 | .269 | -.214 | .532 |
| ln nopat | 80 | -1.20 | 9.59 | 4.5300 | 2.96202 | -.382 | .269 | -.961 | .532 |
| size | 80 | 2.60 | 11.02 | 6.9636 | 2.19564 | -.283 | .269 | -1.106 | .532 |
| age | 80 | 6.00 | 84.00 | 38.7500 | 17.91789 | .746 | .269 | -.252 | .532 |
| Valid N (listwise) | 80 | | | | | | | | |

Table 10 and 11 summarizes the descriptive statistics for the samples drawn before demutualization and after demutualization. The mean and standard deviation for SD are in the order of 1.5855 and 2.33172 during the pre-demutualization period (2014-2015) and in the order of 1.3185 and 2.14380 in the post-



demutualization period (2017-2018). The results indicate slight improvement in the level of risk. As for LEV, the mean is 0.2080 and standard deviation 2.33227 before demutualization and the mean is -.6994 and standard deviation 1.72365 after demutualization. The results are indicative of reduced borrowings in the post demutualization period. The mean and (standard deviation) before demutualization for VT is 1.6660 (2.59061) while it is 1.2106 (2.69959) in post-demutualization period. The statistic indicates slight fall in the post-demutualization period. The pre-demutualization mean (standard deviation) for 'ROE' is 2.0715 (1.48231) while post-demutualization mean (standard deviation) is 2.0026 (1.54931) indicating slight fall. The statistic for NOPAT is mean 4.2155 and standard deviation 3.01957 in pre-demutualization period and mean 4.5300, standard deviation 2.96202 in post-demutualization period showing slight improvement. The pre-demutualization statistic for SIZE is mean 6.5595 standard deviation 2.48256 and post-demutualization statistic is mean 6.9636 while standard deviation is 2.19564 reflecting slightly reduced risk in post-demutualization period. Skewness test is performed to assess the degree of asymmetrical deviation of dataset from symmetrical bell curved normal distribution in order to know the direction of outliers. The skewness test revealed that LEV, NOPAT and SIZE are left skewed. A statistical measure that is used to describe risk of volatility in a dataset is known as Kurtosis. It describes the data that resides in the tails when plotted as a curve. The Kurtosis measure indicated that SD, ROE, NOPAT, and AGE are platykurtic while LEV is leptokurtic.

Table 12

Volatility - Model Summary Before Demutualization

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|---------------|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change | |
| 1 | .549 ^a | .301 | .243 | 2.02808 | .301 | 5.238 | 6 | 73 | .000 | .911 |

Table 13

Volatility - Model Summary After Demutualization

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|---------------|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change | |
| 1 | .626 ^a | .392 | .342 | 1.73835 | .392 | 7.858 | 6 | 73 | .000 | 1.062 |

A goodness-of-fit measure for linear regression models is R-squared indicating variation in the dependent variable explained by independent variables collectively. Table 13 shows R-squared after demutualization at .392 meaning 39.2 percent of the variation in the dependent variable can be predicted from independent variables collectively. The result of Durbin-Watson autocorrelation test shows 1.062 in the post demutualization period indicating positive autocorrelation.



Table 14
Volatility - Coefficients Before Demutualization

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Correlations | | | Collinearity Statistics | |
|---------------|-----------------------------|------------|---------------------------|-------|------|--------------|---------|-------|-------------------------|-------|
| | B | Std. Error | Beta | | | Zero-order | Partial | Part | Tolerance | VIF |
| 1 (Constant) | .811 | 1.008 | | .804 | .424 | | | | | |
| ln lev | -.381 | .114 | -.381 | 3.334 | .001 | -.367 | -.364 | -.326 | .732 | 1.365 |
| ln vt | -.300 | .096 | -.333 | 3.118 | .003 | -.290 | -.343 | -.305 | .839 | 1.192 |
| ln roe | -.291 | .257 | -.185 | 1.134 | .261 | .046 | -.132 | -.111 | .359 | 2.783 |
| ln nopat size | .078 | .124 | .102 | .634 | .528 | .101 | .074 | .062 | .374 | 2.676 |
| age | .274 | .099 | .292 | 2.775 | .007 | .230 | .309 | .272 | .868 | 1.152 |
| | -.005 | .015 | -.037 | -.317 | .752 | .122 | -.037 | -.031 | .715 | 1.399 |

Table 15
Volatility - Coefficients After Demutualization

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Correlations | | | Collinearity Statistics | |
|--------------|-----------------------------|------------|---------------------------|--------|------|--------------|---------|-------|-------------------------|-------|
| | B | Std. Error | Beta | | | Zero-order | Partial | Part | Tolerance | VIF |
| 1 (Constant) | -3.323 | .934 | | -3.557 | .001 | | | | | |
| ln lev | -.295 | .131 | -.237 | -2.255 | .027 | -.351 | -.255 | -.206 | .754 | 1.326 |
| ln vt | -.152 | .090 | -.191 | -1.681 | .097 | -.251 | -.193 | -.153 | .644 | 1.552 |
| ln roe | .222 | .248 | .161 | .897 | .372 | .271 | .104 | .082 | .260 | 3.846 |
| ln nopat | -.066 | .122 | -.092 | -.541 | .590 | .215 | -.063 | -.049 | .291 | 3.440 |
| size | .393 | .103 | .402 | 3.803 | .000 | .208 | .407 | .347 | .743 | 1.345 |
| age | .045 | .013 | .375 | 3.481 | .001 | .410 | .377 | .318 | .718 | 1.394 |

To consider how much variation in the dependent variable is caused by independent variables used in the model and also to ascertain if the model is a good fit, I resort to multivariate linear regression



analysis. However, it is important to establish if the dataset meets the assumptions of OLS regression in order to avoid spurious output. By comparing the results of linear regression before and after demutualization, as reported in Table 14 and Table 15, I form an opinion as to whether there has been a positive impact on the stock market liquidity and volatility climate following demutualization of PSX. The coefficients, as shown in Table 14 and 15, show generally mixed performance overall. The post-demutualization LEV at -.237(standardized) shows improvement over pre-demutualization LEV at -.381 (standardized). The VT at -.191 in the post-demutualization period indicates improvement over pre-demutualization -.333. The ROE at .161 in the post-demutualization period indicates improvement over pre-demutualization period -.185. The post-demutualization NOPAT at -.092 reflects decline from.102 in pre-demutualization period. SIZE at .402 in post-demutualization period indicates improvement over pre-demutualization period .292. AGE at .375 in post-demutualization period reflects improvement over pre-demutualization -.037. The t-values in post-demutualization period indicate mixed results with ROE, SIZE, and AGE indicating positive results while LEV, VT, and NOPAT showing negative values. The p-values are significant for the variables: LEV, SIZE, and AGE while insignificant for the variables: VT, ROE, and NOPAT. The significance test at 95 percent confidence level shows generally mixed results in post-demutualization period. The VIF values are generally less than 3 indicating low correlation among variables except for ROE and NOPAT which are above 3.

Table 16
Volatility - Correlation Before Demutualization

| | | ln sd | ln lev | ln vt | ln roe | ln nopat | size | age |
|---------------------|----------|-------|--------|-------|--------|----------|-------|-------|
| Pearson Correlation | ln sd | 1.000 | -.367 | -.290 | .046 | .101 | .230 | .122 |
| | ln lev | -.367 | 1.000 | .150 | -.436 | -.378 | .026 | -.379 |
| | ln vt | -.290 | .150 | 1.000 | -.073 | .018 | .248 | -.343 |
| | ln roe | .046 | -.436 | -.073 | 1.000 | .775 | -.092 | .296 |
| | ln nopat | .101 | -.378 | .018 | .775 | 1.000 | .050 | .269 |
| | size | .230 | .026 | .248 | -.092 | .050 | 1.000 | -.248 |
| | age | .122 | -.379 | -.343 | .296 | .269 | -.248 | 1.000 |

Table 16 represents results for correlation among explanatory variables affecting SD before demutualization. Table 16 shows that values for SD correlate positively with the explanatory variables ROE, NOPAT, SIZE, and AGE, while SD correlate negatively with explanatory variables LEV, and VT.

Table 17
Volatility - Correlation After Demutualization

| | | ln sd | ln lev | ln vt | ln roe | ln nopat | size | age |
|---------------------|----------|-------|--------|-------|--------|----------|-------|-------|
| Pearson Correlation | ln sd | 1.000 | -.351 | -.251 | .271 | .215 | .208 | .410 |
| | ln lev | -.351 | 1.000 | .187 | .018 | -.167 | .014 | -.273 |
| | ln vt | -.251 | .187 | 1.000 | -.263 | -.050 | .386 | -.355 |
| | ln roe | .271 | .018 | -.263 | 1.000 | .795 | .081 | .281 |
| | ln nopat | .215 | -.167 | -.050 | .795 | 1.000 | .145 | .190 |
| | size | .208 | .014 | .386 | .081 | .145 | 1.000 | -.311 |



| | | | | | | | |
|-----|------|-------|-------|------|------|-------|-------|
| age | .410 | -.273 | -.355 | .281 | .190 | -.311 | 1.000 |
|-----|------|-------|-------|------|------|-------|-------|

Table 17 represents results for correlation among explanatory variables affecting SD before demutualization. Table 17 shows that values for SD correlate positively with the explanatory variables ROE, NOPAT, SIZE, and AGE, while SD correlate negatively with explanatory variables LEV, and VT.

Conclusion

The paper aimed at identifying the impact of demutualization of stock exchange on liquidity and volatility at PSX and to provide better comparison pre-post demutualization, the study selected two years prior to demutualization and two years after demutualization. The proxy used to project liquidity was volume of trade which shows investors' trust and confidence in the post-demutualization era while the proxy used to focus volatility was standard deviation. The study selected explanatory variables that were considered relevant to the dependent variables. The statistical tests generally revealed mixed performance whereas the p-values were found statistically significant stipulating positive impact of demutualization on liquidity and volatility at PSX during the period selected for the study.

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