RESEARCH ARTICLE

▪ Vol. 5, No. 1 (Winter 2024)
▪ Pages: 52 – 65
▪ p-ISSN: 2791-0245
▪ DOI: 10.55737/qjssh.143130975
▪ e-ISSN: 2791-0229

Open Access

QLANTIC JOURNAL OF SOCIAL SCIENCES AND HUMANITIES

Measuring the Performance of KSE100: The Impact of Demutualization

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Abstract: *The purpose of this study is to assess how the demutualization process has affected the performance of the KSE100 Benchmark Index. The study utilized Descriptive Statistics and a Paired sample t-test, as well as daily data from KSE-100 spanning 2009 to 2019. This data was analysed in terms of market capitalization, traded value, daily stock returns, and trading volume. Our results show that, overall, market capitalization increased significantly during the period, except in the second phase. Daily stock returns for the KSE100 Index did not improve over the entire period, though the decrease was not statistically significant. Trading volume did not improve and decreased significantly in both the first and second phases, but increased after the listing of the Pakistan Stock Exchange on its own exchange. The overall conclusion is that the performance of the Index improved, which is a crucial finding for foreign investors looking to invest in the Pakistani stock market. The study is also significant for institutional investors, local investors, potential investors, and portfolio managers who are interested in the growth and development of the stock market. This study is a valuable addition to existing literature, as a significant portion of the existing literature on the demutualization of the Pakistan Stock Exchange is qualitative.*

Key Words: Demutualization, Pakistan Stock Exchange, Market Capitalization, Traded Value, Stock Returns, Trading Volume

Introduction

The restructuring of stock exchanges has been sparked by globalization, technological advancements, and intensified competition. In the early 1990s, mutual non-profit organizations that operated as stock exchanges began to convert to for-profit, shareholder-owned organizations. The Stockholm Stock Exchange in Sweden was the first to demutualize in 1993 and was subsequently listed on its own stock exchange in 1998. Many other stock exchanges followed suit by merging and issuing shares to become for-profit companies after the demutualization of the Stockholm Stock Exchange (Serifosy, 2008). Demutualization is the process of transforming a mutually owned organization into a private or publicly listed company (Bousseta, 2017). After the listing, a demutualized stock exchange typically undertakes an initial public offering, which is likely to improve its financial performance. Demutualization also improves governance and financial viability, which directly impacts performance. This process results in a change in the legal status of the exchange, from one vote per member to one vote per share (Aggarwal, 2002).

The Karachi Stock Exchange underwent a transformation from being limited by guarantee to limited by shares on August 27, 2012. Following this, the Islamabad Stock Exchange and Lahore Stock Exchange also went through the same process of demutualization. The merger of these stock exchanges led to increased cooperation on a global scale. On January 11, 2016, the three exchanges, LSE, ISE, and KSE, were integrated to form the Pakistan Stock Exchange (PSX) under the Stock Exchanges Demutualization and Integration Act 2012. Members were issued Trading Rights Entitlement Certificates (TRECs) and PSX ownership shares, which separated trading rights from ownership rights. This meant that TREC holders did not need to be shareholders of PSX. As per the Demutualization plan, 40% of its shares were offered to a Chinese consortium, 20% were offered through an initial public offering (IPO), and the remaining 40%

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▪ **To Cite:** dutt, P., Anand, V., & Qureshi, M. N. (2024). Measuring the Performance of KSE100: The Impact of Demutualization. *Qlantic Journal of Social Sciences and Humanities, 5*(1), 52-65. https://doi.org/10.55737/qjssh.143130975

were allocated to listed brokers. The PSX was listed on its own exchange on June 29, 2017, at a strike price of Rs 28 per share.

This paper aims to expand our knowledge of the subject by examining the performance of KSE-100 before and after demutualization. By doing so, we seek to determine whether the process of demutualization led to an improvement in the performance of KSE-100. If it is found that the restructuring of the stock exchange through demutualization had a positive impact, we can conclude that demutualization has indeed resulted in an improvement in the performance of KSE-100.

Several studies have been conducted in Pakistan regarding the demutualization of stock exchanges. The benefits of demutualization include improved corporate governance, access to economic and human capital, increased listings, and international alliances (Ahmed, 2011). The effects of the PSX merger have also been examined, with an emphasis on the need for effective management of the demutualization process to achieve desired outcomes (Masood, 2017). However, most studies in Pakistan have relied solely on qualitative secondary data analysis and have not assessed the specific pre- and post-effects of demutualization using relevant variables. A comparative study of the Karachi Stock Exchange was conducted, which assessed stock market performance before and after the first phase of demutualization (Ihsan, 2018). To date, few studies have focused on the demutualization of the Pakistan Stock Exchange, and no study has examined the pre- and post-effects of the complete demutualization process, which includes privatization and self-listing.

It is crucial to thoroughly examine the effects of demutualization, including privatization and self-listing, both before and after the process. This analysis is particularly important for KSE-100, which serves as a stock index and benchmark for comparing prices on the Pakistan Stock Exchange (PSX) over time. [Plate_number_1] includes companies with the highest market capitalization. Additionally, given the significant changes in the economic and power structure of the securities industry and the restructuring of stock exchanges, evaluating the post-demutualization performance of the Pakistani stock market is essential.

In this study, we use Descriptive Statistics and Paired-Sample t-tests to determine if demutualization has had a positive impact on the performance of KSE100 in terms of Market Capitalization, Traded Value, Daily Stock Returns, and Traded Volume. What sets this analysis apart from previous studies is the use of a new and expanded dataset that covers the merger and self-listing of the Pakistan Stock Exchange on its own exchange. With this new dataset, we are able to gain a better understanding of the pre-and post-demutualization improvements.

The following paper is structured in the following manner. In Section 2, we will present a review of the related literature. After that, in Section 3, we will discuss the empirical method that we used to analyze the pre- and post-demutualization performance of KSE100. Following that, in Section 4, we will discuss the data itself. In Section 5, we will present the results of our empirical analysis and discuss them. Finally, in Section 6, we will conclude the paper, and in Section 7, we will mention any limitations of the study.

Literature Review and Hypotheses Development

There have been many articles exploring the effects of demutualization on global stock markets, but the evidence is mixed. In Wahid et al. 2018, analyzed the financial and stock market performance of 60 stock exchanges in Asia, America, and Europe before and after demutualization. Their research revealed that strategic changes in stock exchanges were more productive. The data was collected from 60 stock exchange markets that are part of the World Federation of Exchanges (WFE). Demutualization appeared to have a more positive impact on the financial performance of stock exchanges in Asia and Europe than in America. However, American stock exchanges appeared to be more progressive in terms of stock market performance than their Asian and European counterparts.

A study conducted by Nyangara and Munsikavanhu in 2014 analyzed 50 stock exchanges between 1990 and 2011. The results of the study showed that demutualized stock exchanges tend to perform better in terms of market capitalization, market liquidity, and companies' listings. Furthermore, the study also found that the automation of stock exchanges contributes to improving stock market performance.

In 2014, Tahir conducted a study on stock exchanges that were members of the World Federation of Exchanges, both before and after undergoing demutualization. The study found that demutualized stock exchanges showed a significant improvement in performance, as evidenced by increased liquidity (both short and long-term), profitability, and earning capacity.

In 2013, a study was conducted to investigate the financial market's response to the IPO of the Warsaw Stock Exchange using the Event Study methodology. The study analyzed the performance of the WIG20 Index, which showed positive returns in the short term. However, the market had already discounted the positive reaction upon the release of the IPO announcement one month earlier. In Worthington 2006, conducted a study on the market risk of four self-listed and mutualized stock exchanges. They used a bivariate generalized autoregressive conditional heteroskedastic (GARCH) model to estimate the time-varying beta for a sample of exchanges that had been demutualized by June 7th, 2005. The study showed significant beta volatility in the results. In Otchere 2007, conducted a study on the Australian Stock Exchange (ASX) to assess the effects of demutualization and self-listing. The findings showed a significant improvement in the ASX's profitability ratios in the five years following demutualization and self-listing. Additionally, the study revealed an increase in trading activity by foreign investors after self-listing. In Morsy and Rwegasira 2010, conducted a study that examined the effects of demutualization on stock exchange performance. They tested 16 different market measures and found that only 7 of them showed improvement. Specifically, out of the 16 measures, 6 showed improvement, including market capitalization, total value of traded shares, new capital raised by IPOs, velocity turnover, total transactions, and number of listed companies.

According to Treptow's 2006 study, demutualization can improve liquidity. The study analyzed 156 securities listed on two markets, including the New York Stock Exchange, over a ten-year period. The results showed that demutualized stock exchanges had better performance, higher turnover, and greater liquidity. Additionally, the demutualized market helped to lower trading costs and increase trading volumes. In Krishnamurti et al. 2003, conducted a study on the Indian stock market. Their research compared the National Stock Exchange, which was demutualized, and the Bombay Stock Exchange, which was mutualized. The study revealed that despite having the same system of working, the demutualized national exchange had better trading cost efficiency than the Bombay Stock Exchange. In 2006, Aggarwal and Dahiya conducted a study on the effects of demutualization on the performance of stock exchanges. They measured Return on Equity (ROE), Return on Asset (ROA), and operating margin to determine the impact on shareholder returns and operating activities. The study revealed that demutualization had a positive impact on stock exchange performance, resulting in improved returns for shareholders and better operating activities.

This study uses the Benchmark Index, KSE-100, and insights from empirical literature to examine if demutualization can improve the Pakistan Stock Exchange's performance. Our hypothesis is as follows:

Hypothesis 1 (H1): Demutualization has a positive impact on market capitalization

Based on the research, it appears that demutualization can lead to improved market capitalization and increased shareholder value. Demutualization involves converting an exchange into a for-profit corporation, and studies have shown that this can result in better profits, higher trading values, and lower transaction costs. Additionally, demutualization has been linked to market growth and increased trading volume for exchanges such as the London Stock Exchange and the stock market in Italy. Comparing pre and post-demutualization revenues, one study found that demutualization has a positive impact on trading volume. Therefore, we hypothesize that demutualization can be beneficial for exchanges seeking to optimize their potential for market capitalization and shareholder value.

Hypothesis 2 (H2): Demutualization has a positive impact on the traded value.
Hypothesis 3 (H3): Demutualization has a positive impact on the daily stock returns.
Hypothesis 4 (H4): Demutualization has a positive impact on the trading volume.

A research study was conducted to compare the performance of the Karachi Stock Exchange before and after the first phase of demutualization. The study, conducted by Ihsan in 2018, evaluated the stock

market's performance during these periods. While there is existing literature on the demutualization of the Pakistan Stock Exchange, most of it focuses on qualitative analysis. So far, no specific study has been conducted to evaluate the effects of the complete process of demutualization, which includes privatization and self-listing. Therefore, further testing is required.

Methodology

In this report, we utilized Descriptive Statistics and a Paired Sample t-test to compare and analyze the pre and post-demutualization performance of KSE-100. The paired t-test is a statistical method that compares the means and standard deviations of two related groups to determine if there is a significant difference between them. We looked at market capitalization, traded value, daily stock returns, and trading volume to make our analysis.

Financial time series data typically contains a unit root, which makes the data nonstationary and can result in unreliable conclusions. Therefore, we checked for stationarity using the Augmented Dickey-Fuller Test to obtain accurate results. We also converted the data into logarithmic form and examined histograms to ensure normality.

Market capitalization, traded value, and traded volume were already available, so we did not need to calculate them. However, we calculated the daily stock returns using a formula adapted from (Hammad et al., 2015) and (Mrzygold and Nowak, 2013). The actual daily returns of the KSE100 Index were calculated using the formula we derived.

$$Y_t = ln\frac{P_t}{P_t - 1}$$

Where

Y_t = Daily Returns of KSE Index

L_n = Natural Logarithm

P_t = Closing prince of KSE 100 Index at day t

P_{t-1} = Closing prince of KSE 100 Index at day $_{t-1}$

- To evaluate the performance of KSE100 before and after demutualization, a paired sample t-test was performed using daily stock returns, market capitalization, traded volume and daily stock returns. Pallant (2013) suggests that the assumptions of the paired sample t-test should be thoroughly tested.
- The dependent variables should be continuous (interval or ratio scale).
- The dependent variables need to be normally distributed.
- There should be no outliers/extreme values in the dependent variables.
- The observations must be independent of each other, i.e., each observation must not be influenced by any other observation.

During the testing phase, it was discovered that the dependent variables were continuous and did not have a sufficiently normal distribution. However, if the sample size exceeds 30, the violation of the normality assumption should not significantly impact the results. Therefore, for samples larger than 30, the results will still be reliable even if normality is violated (Pallant, 2003). It was also determined that the observations were independent and not influenced by each other.

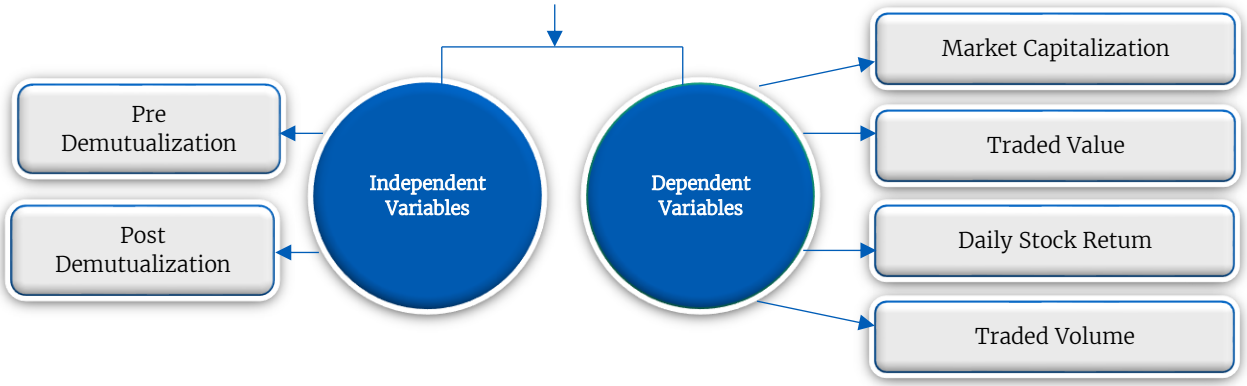
A paired Sample T-Test will be applied to the following pairs.

Pair 1: Pre-market capitalization and post-market capitalization.
Pair 2: Pre-traded value and post-traded value.
Pair 3: Pre-daily stock returns and post-daily stock returns.
Pair 4: Pre-traded volume and post-traded volume.

The variables in the above pairs are explained as follows:

Figure 1

Conceptual framework of study



Market Capitalization

Market capitalization is determined by multiplying the current market price of a company's shares with its total outstanding shares. This metric reflects the size and strength of a stock exchange and provides insight into the magnitude and stability of a stock market.

Traded Value

The market capitalization of a stock exchange is determined by multiplying the daily trading volume with the share prices. This represents the total market value at which shares of all listed companies are traded on a daily basis and indicates the level of market activity on the exchange.

Trading Volume

Trading volume refers to the number of shares traded during a particular time period. It is a measure of market liquidity at any given time and reflects the overall value of a stock market. A high trading volume in either direction, whether it is an upward or downward movement, indicates a significant market shift that may indicate the positive or negative performance of a stock exchange.

Daily Stock Return

The daily stock return is calculated as a percentage change from the previous day's closing price. A positive return indicates a gain in value, while a negative return indicates a loss in value.

Data

The study utilized daily market capitalization, traded value, stock returns, and trading volume data from KSE100. This data was obtained from secondary sources and represents a time series from 2009 to 2019. Due to the impact of COVID-19, data from 2020 and 2021 were not included in the study. The stock markets experienced a crash in 2020 as a result of travel restrictions and lockdown measures implemented worldwide. Notably, data prior to August 27th, 2012, reflects pre-demutualization, while data after this date represents post-demutualization. The three stock exchanges in Pakistan transitioned to for-profit organizations during this period. Post-demutualization data also includes information after January 11th, 2016, when the three stock exchanges merged, but prior to the listing of the Pakistan Stock Exchange on its own stock exchange. Finally, data after June 29th, 2017, reflects the period when PSX was formally listed on its own stock exchange and completed the demutualization process.

The dataset taken in the study is a time series. We first ascertain whether the time-series dataset is stationary. For this exercise, the unit root (augmented Dicky and Fuller 1979) test is applied. Since this test is well-known. We will not explain it here, except to note that the results are summarized in Tables 1, 2 and 3. and are tested for stationarity by unit root test. The augmented Dicky Fuller (ADF) test is used to check the stationarity. There are many unit root tests to check the stationarity, but the ADF test is used because it is more reliable.

Tables 1, 2 and 3 give the results of the ADF tests for all the series of market capitalization, traded value,

daily stock returns and trading volume before and after demutualization. The p-values obtained by the tests are less than the significance level (say 0.05). Thereby inferring that all the pre and post-demutualization series are stationary.

Table 1

Results of the ADF test

Variables		Level	t-stat	Prob.
Market Capitalization Pre	ADF Test Statistics Test critical values	1% 5% 10%	-12.65858 -2.568481 -1.941305 -1.616376	0.000
Post	ADF Test Statistics Test critical values	1% 5% 10%	-23.85023 -2.568413 -1.941296 -1.616382	0.000
Traded Value Pre	ADF Test Statistics Test critical values	1% 5% 10%	-17.53052 -2.568444 -1.941300 -1.616379	0.000
Post	ADF Test Statistics Test critical values	1% 5% 10%	-18.66631 -2.568434 -1.941298 -1.616380	0.000
Daily stock return Pre	ADF Test Statistics Test critical values	1% 5% 10%	-24.20988 -2.567799 -1.941212 -1.616438	0.000
Post	ADF Test Statistics Test critical values	1% 5% 10%	-26.61862 -2.56780 -1.941213 -1.616437	0.000
Trading Volume Pre	ADF Test Statistics Test critical values	1% 5% 10%	-1.974600 -2.568444 -1.941300 -1.616379	0.0463
Post	ADF Test Statistics Test critical values	1% 5% 10%	-20.18714 -2.568434 -1.941298 -1.616380	0.000

Table 2

Results of the ADF test

Variables		Level	t-stat	Prob.
Market Capitalization Pre	ADF Test Statistics Test critical values	1% 5% 10%	-25.95656 -2.567758 -1.941206 -1.616442	0.000
Post	ADF Test Statistics Test critical values	1% 5% 10%	-17.31799 -3.438090 -2.864846 -2.568585	0.000
Traded Value Pre	ADF Test Statistics Test critical values	1%	-20.82773 -2.567771	0.000

Variables		Level	t-stat	Prob.
		5%	-1.941208	
		10%	-1.616441	
Post	ADF Test Statistics		-5.448229	0.000
	Test critical values	1%	-3.438061	
		5%	-2.864833	
		10%	-2.568578	
Daily stock return	ADF Test Statistics		-24.33716	0.000
Pre	Test critical values	1%	-2.567758	
		5%	-1.941206	
		10%	-1.616442	
Post	ADF Test Statistics		-24.44920	0.000
	Test critical values	1%	-2.567758	
		5%	-1.941206	
		10%	-1.616442	
Trading Volume	ADF Test Statistics		-1.963954	0.0475
Pre	Test critical values	1%	-2.567771	
		5%	-1.941208	
		10%	-1.616441	
Post	ADF Test Statistics		-2.216802	0.0258
	Test critical values	1%	-2.567768	
		5%	-1.941207	
		10%	-1.616441	

Table 3

Results of the ADF test

Variables		Level	t-stat	Prob.
Market Capitalization	ADF Test Statistics		-4.796835	0.0001
Pre	Test critical values	1%	-3.447214	
		5%	-2.868868	
		10%	-2.570740	
Post	ADF Test Statistics		-19.62343	0.000
	Test critical values	1%	-2.570967	
		5%	-1.941646	
		10%	-1.616149	
Traded Value	ADF Test Statistics		-2.213785	0.0261
Pre	Test critical values	1%	-2.570982	
		5%	-1.941649	
		10%	-1.616147	
Post	ADF Test Statistics		-1.934328	0.0508
	Test critical values	1%	-2.571014	
		5%	-1.941653	
		10%	-1.616145	
Daily stock return	ADF Test Statistics		-1.616145	0.000
Pre	Test critical values	1%	-2.570951	
		5%	-1.941644	
		10%	-1.616150	
Post	ADF Test Statistics		-17.87212	0.000
	Test critical values	1%	-2.570951	
		5%	-1.941644	
		10%	-1.616150	
Trading Volume	ADF Test Statistics		-10.57192	0.000
Pre	Test critical values	1%	-2.571094	

Variables		Level	t-stat	Prob.
		5%	-1.941664	
		10%	-1.616137	
Post	ADF Test Statistics		-17.55675	0.000
	Test critical values	1%	-2.570998	
		5%	-1.941651	
		10%	-1.616146	

Tables 1, 2 and 3 give the results of the ADF tests for the sample period from 2009 to 2019. The dataset contains the daily market capitalization, traded value, daily stock returns and trading volume of KSE-100 before and after demutualization. The p-values obtained by the tests are less than the significance level (say 0.05). Thereby inferring that all the pre and post-demutualization series are stationary.

Results and Discussions

Market analysts often use market capitalization as a way to measure the size of the stock market. Tables 4 and 5 provide us with a clear picture of market capitalization performance.

The empirical analysis presented in this study shows that the market capitalization of shares listed on the KSE improved during the first phase of demutualization, going from pre-demotion (M=0.000406, SD=0.171627) to post-demutualization (M=27.96518, SD=0.361052). The mean increase in market capitalization of shares was 27.964774, and the increase in standard deviation was 0.189425.

A paired sample T-test was conducted to determine whether the difference in the post-demutualization period is statistically significant. The t-statistic value was 1753.831, and the probability was 0.000, [t= 1753.831, $p \leq 0.005$]. The results indicated that demutualization had a positive impact on market capitalization, and the increase was statistically significant. This strongly supports H1, which is accepted. These results are similar to those found in other studies, such as (Islam & Hossain, 2015), (Nyangara & Musikavanhu, 2014), (Morsy & Rwegasira, 2010), (Scullion, 2001), and (Karmel, 2002), which also found an improvement in market capitalization after demutualization.

In January 2012, the Karachi Stock Exchange, which was previously limited by Guarantee, converted into Limited by Shares. By 7 November 2012, the KSE100 index was considered the best emerging market in Asia. Table 4 shows that the traded value of shares listed on KSE100 did not improve during the first phase, going from pre-demotion (M=-0.006883, SD=0.433144) to post-demutualization (M=-0.000724, SD=0.317876). The mean decrease in the traded value of shares was 0.006159, and the decrease in standard deviation was -0.115268. Table 5 shows that the t-statistic value was 0.342493, and the probability was 0.7321, [t= 0.342, $p \geq 0.005$]. The results indicate that demutualization had a negative impact on traded value, and the decrease was not statistically significant. Thus, H2 is rejected, but the decrease is insignificant. These results differ from those found in (Nyangara & Musikavanhu, 2014), which found that demutualized exchanges have the capacity to perform better in terms of traded value. The results are also inconsistent with those found in (Wahid et al., 2017), which noted a significant increase in trading value after demutualization, arguing that demutualization significantly affects trading value.

Stock prices change on a daily basis, altering the value of investments. Table 4 shows that the daily stock return did not improve during the first phase of demutualization, going from pre-demutualization (M=0.000924, SD=0.008740) to post-demutualization (M=0.000623, SD=0.008806). The mean decrease in daily stock return was -0.000301, and the increase in standard deviation was 0.000066. Table 5 shows that the t-statistic value was -0.666427, and the probability was 0.503 [t= -0.666427, $p \geq 0.005$]. The results indicate that demutualization had a negative impact on the daily stock return, and the decrease was not statistically significant. Therefore, H3 is not supported. These results are similar to those found in (Ahmad et al., 2015), who also found insignificant results relating to post-demutualization returns of stock exchanges, arguing that demutualization is not a favourable change from the investor's perspective.

Table 4 shows that the trading volume of shares listed on KSE did not improve during the first phase of demutualization, going from pre-demutualization (M=18.06781, SD=0.637330) to post-demutualization (M=-0.001426, SD=0.343917). The mean decrease in the trading volume of shares was -18.069236, and the

decrease in standard deviation was -0.293413. Table 5 shows that the t-statistic value was -6447941, and the probability was 0.000, [t= -6447941, p ≤ 0.005]. The results indicate that demutualization had a negative impact on trading volume, and the decrease was statistically significant. Therefore, H4 is completely rejected due to the significant decrease in trading volume.

Table 6 displays the market capitalization of shares listed on KSE, which has not shown improvement in the second phase of demutualization from before (M = 28.02411, SD = 0.347489) to after (M = - 7.02E-05, SD = 0.118645). The mean decrease in market capitalization of shares is -28.024180, and the decrease in standard deviation is -0.228844. Table 7 shows that the t-statistic value is -2182.321, and the probability is 0.000, [t= -2182.321, p is less than =0.005]. These results indicate that demutualization has had a negative impact on market capitalization, and the decrease is statistically significant. On the 29th of December 2017, the market capitalization of KSE100 fell to $73.5 billion, which removed $21 billion from the stock market. These results contradict the study by Wahid et al. (2017), who noticed an increase in market capitalization after demutualization due to the attraction of unlisted companies.

Table 6 shows that the traded value of shares listed on KSE has improved in the second phase of demutualization from before (M = 22.62800, SD = 0.477792) to after (M =22.63798, SD = 0.473120). The mean increase in the traded value of shares is 0.00998, and the decrease in standard deviation is -0.004672. Table 7 shows that the t-statistic value is 0.126181, and the probability is 0.8996, [t= 0.126181, p is greater than =0.005]. These results indicate that demutualization has a positive impact on market traded value, and the increase is statistically insignificant. On the 29th of December, the value of all shares ended on KSE100 at $77.55 billion, which showed a slight recovery.

Table 6 shows that stock returns have improved after the second phase of demutualization as the mean value increased from before demutualization of KSE (M = 0.000130, SD = 0.010145) to after demutualization (M = 0.000900, SD = 0.008675). Table 7 shows that the increase is not statistically significant [t = 1.760327, p = 0.0787]. These results were in line with Hammad et al. (2015), who also documented insignificant returns for the Indian stock market after demutualization, recommending that in Pakistan, the demutualization of stock exchanges should be managed effectively and efficiently.

Table 6 shows that the trading volume of shares listed on KSE has not improved after the second phase of demutualization from before (M = 18.63820, SD = 0.446874) to after (M =18.40188, SD = 0.4342112). The mean decrease in the trading volume of shares is -0.23632, and the decrease in standard deviation is -0.434212. Table 7 shows that the t-statistic value is -11.67691, and the probability is 0.000, [t= -11.67691, p is less than =0.005]. These results indicate that demutualization has a negative impact on trading volume, and the decrease is statistically significant. These results are not in line with Krishnamurti et al. (2003), who noted an improvement in the trading volume of a demutualized exchange due to the provision of superior trading services, technologies, and systems.

Overall, the results in the second phase of demutualization show that H2 and H3 are accepted, while H1 and H4 are rejected.

External factors such as political instability, natural disasters, and pandemics like COVID-19 greatly influence the performance of stock markets. In 2016, KSE-100 was the top-performing index in Asia, while in 2017, the PSX ended up as the worst market in the world. The year 2017 was a nightmare for the Pakistani Stock Market due to low volumes and a decrease in revenues of brokerage houses. By December 29, 2017, the market capitalization of KSE100 fell to $73.5 billion, removing $21 billion from the stock market's all-time high. Many analysts and market followers attributed the political instability and tensions between military management, along with anti-budget measures introduced by authorities in May 2017, as reasons for the market's poor performance. The failure of the PSX to attract overseas inflows after it classified for MSCI in May 2017 and the depreciation of the rupee were also factors that discouraged investors.

Table 8 shows that after the PSX listed on its own exchange, the market capitalization of shares listed on KSE100 improved from Time 1 (M=0.000332, SD=0.083317) to Time 2 (M=0.002571, SD=0.074821). The mean increase in market capitalization of shares was 0.002239, and the decrease in standard deviation was -0.008496. Table 9 shows that the t-statistic value is 0.357812, and the probability is 0.000 ([t=0.357812, p is greater than or equal to 0.005]). The results indicated that demutualization had a positive impact on market capitalization, and the increase was statistically insignificant. These results contradict Sial's (2015)

findings, which suggested that demutualization significantly contributes towards increasing market capitalization. Table 8 also shows that the traded value of shares listed on KSE 100 improved from pre (M=21.89943, SD=0.573584) to post (M=22.40000, SD=0.416804) after the PSX's listing.

In this analysis, it was found that the traded value of shares increased by 0.50057, and the standard deviation decreased by -0.15678. Table 9 displays a t-statistic value of 13.96573 with a probability of 0.000, [t= 13.96573, p is less than or equal to 0.005]. These results suggest that demutualization positively impacted the traded value of shares, and this increase was statistically significant. Additionally, the listing of PSX likely increased investor confidence in trading on the stock exchange, as noted by Hughes (2002), contributing to better trading of shares.

Table 8, on the other hand, shows that daily stock returns did not improve after listing. The mean value decreased from pre-demutualization and listing (M = 0.000973, SD = 0.013728) to post-demutualization and listing (M = -0.000534, SD = 0.009758), with a decrease in mean of -0.001507. However, Table 9 indicates that this decrease was not statistically significant [t = -1.751728, p = 0.0806]. As for the traded volume of shares listed on KSE100, it improved after the listing of PSX from pre (M = -0.000459, SD = 0.398503) to post (M =0.000439, SD = 0.358276). The mean increase in the traded volume of shares is 0.000898, and the decrease in standard deviation is -0.040227. Table 9 shows a t-statistic value of 0.035165 with a probability of 0.9720, [t= 0.035165, p is greater than or equal to 0.005]. These results suggest that demutualization positively impacted trading volume, although the increase was statistically insignificant.

Overall, the results show that H1, H2, and H4 are accepted, while only H3 is rejected with an insignificant decrease. In 2017, the stock market faced great distress, but analysts and policymakers expected 2018 to be better. The PSX opened on a positive note in 2018, with the benchmark index KSE100 gaining 240 points to close at 40,711. However, forecasts are not always reliable, especially when studying the Pakistani stock market, which is known for its unpredictable political climate. Nonetheless, the PSX made a comeback in 2019, as evidenced by the results presented in this analysis.

Table 4

First phase of demutualization

	Mean	Median	Maximum	Minimum	St. Dev	Skewness	Kurtosis	Observations
Pre- Market Capitalization	0.000406	9.13E-05	1.834199	-1.350609	0.171627	1.104968	50.51545	635
Post Market Capitalization	27.96518	27.96558	32.66157	27.49281	0.361052	4.134365	46.99444	663
Pre- Traded Value	-0.006883	-0.006883	1.299128	-1.685394	0.433144	0.025937	3.699485	639
Pre- Traded Value	-0.000724	-0.000534	1.134971	-1.019997	0.317876	0.109873	3.602748	662
Pre- Daily Stock Returns	0.000924	0.001200	0.044186	-0.045580	0.008740	-0.497187	6.394007	672
Post Daily Stock Returns	0.000623	0.000000	0.030694	-0.040578	0.008806	-0.229790	5.429014	672
Pre- Trading Volume	18.06781	18.06894	19.59510	15.30811	0.637330	-0.369421	3.483451	666
Post Trading Volume	-0.001426	0.007127	1.270309	-1.027502	0.343917	0.127321	3.354716	671

Table 5

Paired sample t-test

		Mean	Standard Deviation	t-statistic.	Prob
Pair 1	Pre-Market Capitalization Post-Market Capitalization	27.97849	0.399139	1753.831	0.0000
Pair 2	Pre-Traded Value Post Traded Value	0.007381	0.540909	0.342493	0.7321
Pair 3	Pre- Stock Returns Post Stock Returns	0.000290	0.012417	-0.666427	0.5053

		Mean	Standard Deviation	t-statistic.	Prob
Pair 4	Pre- Trading Volume Post Trading Volume	18.06982	0.722676	-644.7941	0.0000

The table reports the paired sample differences for mean and standard deviation. The t-statistic and probability values in the table indicate whether the differences are statistically significant or not.

Table 6

Second phase of demutualization

		Mean	Median	Maximum	Minimum	St. Dev	Skewness	Kurtosis	Observations
Pair 1	Pre- Market Capitalization	28.02411	28.04627	32.66157	27.49281	0.347489	3.388779	41.96300	820
	Post Market Capitalization	-7.02E-05	-0.000105	2.289179	-2.298397	0.118645	-0.102175	42.1632	826
Pair 2	Pre- Traded Value	22.62800	22.65650	23.75915	21.09975	0.477792	-0.397649	2.943449	821
	Post Traded Value	22.63798	22.62394	24.63875	21.16414	0.473120	0.137495	2.926123	821
Pair 3	Pre- Daily Stock Returns	0.000130	0.000208	0.040434	-0.047650	0.010145	-0.196992	5.128243	829
	Post Daily Stock Returns	-0.000900	0.001052	0.044186	-0.045580	0.008675	-0.524868	6.381355	829
Pair 4	Pre- Trading Volume	18.63820	18.67446	19.73619	17.11248	0.446874	0.245357	2.656602	829
	Post Trading Volume	18.40188	18.38876	19.76745	17.05054	0.434212	0.046908	2.707311	829

The sample covers the pre and post-demutualization dataset from 2012 to 2019 with the daily frequency. The table reports mean, median, maximum, standard deviation, skewness and kurtosis.

Table 7

Paired sample t-test

		Mean	Standard Deviation	t-statistic	Prob
Pair 1	Pre-Market Capitalization Post-Market Capitalization	-28.02371	0.367044	-2182.321	0.0000
Pair 2	Pre-Traded Value Post- Traded Value	0.003014	0.684432	0.126181	0.8996
Pair 3	Pre- Stock Returns Post Stock Returns	0.000770	0.012594	1.760327	0.0787
Pair 4	Pre- Trading Volume Post- Trading Volume	-0.235705	0.580839	-11.67691	0.0000

The table reports the paired sample differences for mean and standard deviation. The t-statistic and probability values in the table indicate whether the differences are statistically significant or not.

After Listing of PSX on its Own Stock Exchange

Descriptive Statistics Summary

Table 8

		Mean	Median	Maximum	Minimum	St. Dev	Skewness	Kurtosis	Observations
Pair 1	Pre- Market Capitalization	0.000332	9.13E-05	0.961957	-0.982979	0.083317	-0.304337	107.9107	379
	Post Market Capitalization	0.002571	-0.000661	1.435818	-0.239607	0.074821	18.14393	350.0135	387
Pair 2	Pre- Traded Value	21.89943	21.92721	23.34710	-19.69664	0.573584	-0.303642	3.055706	388
	Post Traded Value	22.40000	22.37142	23.82418	21.16414	0.416804	0.284491	3.136764	388

		Mean	Median	Maximum	Minimum	St. Dev	Skewness	Kurtosis	Observations
Pair 3	Pre- Daily Stock Returns	0.000973	00.000696	0.175770	-0.040434	0.013728	-0.497187	69.54626	388
	Post Daily Stock Returns	-0.000534	-0.000255	0.040578	-0.028161	0.009758	0.212892	4.525752	388
Pair 4	Pre- Trading Volume	-0.000459	-0.012172	1.300524	-1.312879	0.398503	0.106778	3.632027	387
	Post Trading Volume	0.000439	0.002417	1.384515	-1.033019	0.358276	0.161992	3.444818	387

The sample covers the pre and post-demutualization dataset from 2016 to 2019 with the daily frequency. The table reports mean, median, maximum, standard deviation, skewness and kurtosis.

Table 9

Paired sample t-test

		Mean	Standard Deviation	t-statistic	Prob
Pair 1	Pre-Market Capitalization Post-Market Capitalization	0.002083	0.113316	0.357812	0.7207
Pair 2	Pre-Traded Value Post Traded Value	0.500573	0.706024	13.96573	0.0000
Pair 3	Pre- Stock Returns Post Stock Returns	-0.001507	0.016951	-1.751728	0.0806
Pair 4	Pre- Trading Volume Post- Trading Volume	0.000898	0.502419	0.035165	0.9720

The table reports the paired sample differences for mean and standard deviation. The t-statistic and probability values in the table indicate whether the differences are statistically significant or not.

Conclusion

This analysis focuses on the impact of demutualization on KSE100's performance, specifically in terms of market capitalization, traded value, daily stock return, and trading volume. The study aims to answer questions about whether demutualization improves stock exchange performance. Results from 2009 to 2019 show that market capitalization improved, except for the second phase, which included 2017, a year of political instability in Pakistan. Traded value also improved after demutualization, with only a minor decrease in the first phase. Daily stock returns did not improve overall, although the decrease was statistically insignificant. Trading volume decreased significantly in the first and second phases but improved after PSX listed on its own exchange. The overall results indicate improved performance, which is significant for foreign investors, institutional investors, local investors, potential investors, and portfolio managers interested in the growth and development of the stock market. The study is also useful for regulators and policymakers involved in the conversion of three stock exchanges in Pakistan from mutualized to demutualized structures and their merger into the Pakistan Stock Exchange. Demutualization increases transparency and enhances corporate governance, improving investor trust and confidence. It is a positive step for the stock market, attracting significant investments and credibility. Future research can use this study as a template to explore the relationship between demutualization and economic growth and test its effects on information efficiency in the stock market. Demutualization has improved Pakistan's market image for foreign investors, and its impact on corporate governance should be investigated further.

Limitations

For this study, the dataset from 2020 and 2021 was excluded due to the impact of COVID-19. The stock markets experienced a crash in 2020 as a result of global lockdowns. However, there are additional limitations to this study, which include the following:

1. The study did not consider the months of demutualization since this process was being incorporated during that time.

2. Apart from demutualization, political factors can also affect the data. For instance, the study found that political instability in Pakistan led to underperformance in the stock market in 2017.
3. Similarly, economic factors, not just demutualization, can also influence the data.

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