Comparing the Impact of Pakistan KSE-100, KSE-30 and KMI-30 on Each Other: An Analysis Based Approach from 2009-2019

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Abstract

In this study the extent of the relationship between stock exchange markets of Karachi namely KSE-100, KSE-30 and KMI-30 with each other and the outcome in relation to the historic happenings is carried out. The work also examines whether long run relationship between them exists or not and for the said purpose the data sets from the years January 2009 to February 2019 has been taken.

The research uses Chow test to study the three break points starting from 2009 till the end of 2018. We observed that the break periods are significant starting from 2009 to 2016 then from 2016 to 2017 and finally from 2017 to 2019 and onwards. The pattern observed in all three stock exchange markets is somewhat the same wherein the KMI-30 is the leading stock exchange index as compared to the other two. The study also incorporates unit root test and it was deduced that all indices are not stationary at level. Furthermore, no cointegration was found which shows that there exists no long-run association among them which implies that the three indices do not significantly influence on each other.

Key words: ADF test, Chow test, Unit root test, Cointegration techniques

Introduction

Stock markets are the modern indicators of economic performance and plays crucial role in economic growth. Stock market acts as a hub and facilitates investors to invest and sell their assets in the form of bonds, dividends, shares etc. They provide a platform to do businesses by providing a base for trade in various financial derivatives and securities without any barriers. In present times long term investors are investing their capital in business schemes through public issues. Stock markets are means of mobilizing resources to and from entrepreneurs and governments as they offer liquidity in the market economy. Long-term association between stock exchange markets gives a better idea for allocation of resources in various sectors thus, enhancing long-term economic development prospects.

In Pakistan PSX the stock exchange markets of Karachi, Islamabad and Lahore are included whereas Karachi stock market comprises KSE-100, KSE-30 and KMI-30. The comparison of different stock exchange markets within a given economy manifests true market situations in various regions of a country thus, providing insights to businessmen, investors and general public to trade and invest for maximizing profits.

KSE Meezan Index (KMI-30) started its operation from 2009 and has in his folds 30 most liquid Shariah biddable companies listed at PSX. The objective of KMI-30 is to serve as a measure for gauging the performance of Shariah complaisant equity investments. The index is assessed using free float market capitalization. The constituents in the index are capped in relation to the total capitalization of Islamic index at 12% on the first day of confirmation. Ensuing confirmation dates, any one of the constituents found breaking the limit will be brought in line and any surplus free-float capitalization will be dispersed to remaining companies in relation to their relative capitalization in the index.

KSE 30 Index includes the top 30 most liquid firms listed on PSX based on Free Float methodology. It started operation with the base value of 10,000 points from September 1, 2006. The key point of this index that distinguishes it from other indices are that it is the only index that is operated on free float off shares and not based on paid up capital. One other unique feature of this index is that 30

companies participates in it whereas other indices embodies the total return on the market.

The Karachi Stock Exchange 100 (KSE-100) index which was established on August 14, 1947 is now a part of PSX. It is the prime stock exchange index of Pakistan with over 100 largest companies enlisted based on market capitalization and represents all the market sectors of PSX. KSE-100 index also considered as the benchmark to compare prices on the Pakistan Stock Exchange (PSX) and represents 85% of the total market capitalization. Free Float Market Capitalization methodology is used to calculate the index.

Pakistan Stock Exchange Index (PSX) was founded on January 11,2016 after the amalgamation of individual stock exchanges of Islamabad, Karachi and Lahore. PSX origin lay in the foundation of the Karachi Stock Exchange established in 1947, the Lahore stock Exchange established in 1970 and lately the Islamabad Stock Exchange established in 1992 (Akhtar 2016).

The main reason behind the PSX evolution was not only to broaden the floor base for trading but also to accommodate the diversified time trading pattern in the entire length and breadth of national economy thus offering greater opportunity and versatility to maximize gains.

Pakistan has geared up her market to international standards and has liberalized her economy using information technology to channelize market gain and performance. The research will help to have a better understanding of the past, present and future aspects of the Pakistan Stock Market.

Literature Review

Ahsan et al. (2019) studied the influence of CPEC on Pakistan Stock Market (PSX) and Shanghai Stock Exchange (SSE) by applying GARCH and EGARCH models. Empirical investigations demonstrate that in PSX risk parameter is slightly higher in post-CPEC as compared to pre-CPEC period. Volatility of SSE was found high in both pre and post-CPEC period in contrast to PSX. Yang et al. (2003) investigated the financial crisis of ASEAN countries was. They employed vector error correction model based on cointegration and found that the markets move closer together in the post-crisis period. In another study Gregory and Hansen (1996) established

cointegration test to investigate a single structural break present in the data and found that the tests can identify cointegrating relations when there is a break in the intercept and / or slope coefficient. Ciuiu et al. (2015) applied the causality Granger test and Chow breakpoint test. The closure prices of Romanian day ahead energy markets and different primary energy sources production such as coal, hydrocarbons, nuclear, wind and hydro energy were used as a case study. Their results showed that the average prices and the peak prices are Granger causes for the hydrocarbon quantities. Luitel & Mahar (2015) checked the structural changes using Chow break point test for US economy (GDP). They found structural break due to switching from SIC to NASIC system. The global crisis for the period 2007-2009 was affected real estate prices of New Zealand while New Zealand was not the close trading partner of USA. Li (2012) used Chow test to find out the structural break in the first quarter of 2008 in New Zealand housing prices. In another paper Bolibok (2017) discussed the global financial crisis 2008 which also affected European capital markets caused a serious and prolonged contraction of economic activity in developed and emerging economies around the world. Khan (2011) examined the long-run relationship by using Johnson cointegration of the USA and 22 other developed and developing countries. Results indicated that Johnson cointegration was failed to find the cointegration in most of the countries. Johansen cointegration method was used to explore long-run association between the Indian stock market and three developed Asian markets namely Hong Kong, Japan and Singapore (Gupta & Guidi 2012). Employing Johansen cointegration method they did not find the evidence of cointegration among these countries. Furthermore, Gregory-Hansen test was employed which also reject the null hypothesis of no cointegration with structural breaks among these markets. Beside these they also applied bivariate DCC-GARCH model to model the dynamic correlation. DCC-GARCH model showed that correlation between India and selected market increased dramatically during the study period.

Methodology

Cointegration:

Empirical research in macroeconomics as well as in financial economics is largely based on time series. Macroeconomists build time-series models for testing economic theories, for forecasting, and for policy analysis. Such models are constructed and applied by economists at universities, economic research institutes and central banks. According to Johansen (1988), the Cointegration theory is certainly the innovation in theoretical econometrics that has created the most interest among economists in the last decade. x_t and y_t are said to be Cointegrated if there exists a parameter α such that:

$$u_t = y_t - ax_t$$

is a stationary process. In other words, the non-stationary time series in y_t are cointegrated if there is a linear combination of them that is stationary or I(0).

Chow break point test:

Financial and economic series often contain a structural break, due to change in monetary policy, instability of political situation or sudden shock to the economy. In 1960 Gregory Chow proposed Chow test (Chow 1960) to test the presence of a structural break at a period which can be assumed to be known *a priori*. Therefore, Chow break point test is appropriate to identify that a structural break in one series can give useful clues as to whether such a change is being propagated across other variables.

A chow test is based on the following steps:

1) A regression model is developed for the whole data.
2) Regression model is constructed before structural break.
3) After the structural break regression model is built.

The residual sum of squares for each regression is used to calculate the Chow statistic using the following formula:

$$CHOW = \frac{\left(RSS_p - (RSS_1 + RSS_2)\right)/k}{(RSS_1 + RSS_2)/(N_1 + N_2 - 2k)}$$

Data analysis and results:

Monthly closing prices of the three indices of Pakistan stock exchange namely; KSE-100, KMI-30 and KSE-30 are taken from

www.Investing. com for the period from January 1, 2009 to February 28, 2019. Time series plot of three stocks are given in fig. 1. Comparing KSE 100, KSE 30 and KMI 30 we observed that all the indices follow the same pattern and trend. Time series data started from 2009 to 2018 annually. We observed the smooth increasing trend pattern from 2009 to mid of 2015 i.e. economic was flourishing. Period from 2016 to end of 2016 shows a high increase in stock markets. However, the period December 2016 to 2018 shows high volatility (due to political turmoil). The political instability led to social chaos which in turn led to economic recession. Another factor responsible for the downward trend was interim government setup and conduct of elections in the year 2018.
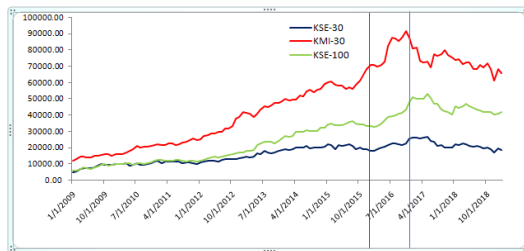

Fig. 1: Daily closing price of KSE-100, KMI-30, KSE-30

Amongst all three stock exchanges KMI-30 is the leading index as shown in the graph while KSE-100 and KSE-30 show interchanging overlapping trend all along the time period taken. KMI-30 looks to follow KSE-100 but KSE-30 shows a little different pattern with respect to KSE-100. Also, KMI-30 and KSE-100 look to follow the same pattern. Red line shows a sudden increasing trend from last of 2016 till first quarter of 2017. A blue line shows really decreasing trend i.e. from mid of 2017 to till now with continuous up and downs.
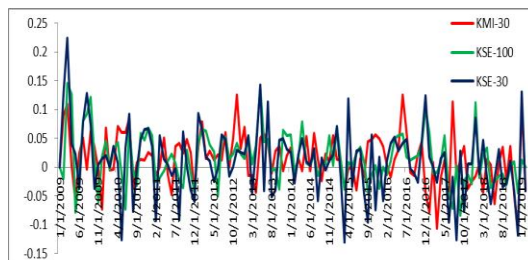

Fig. 2: Returns of KSE-100, KMI-30, KSE-30

Fig. 2 depicts that movement of all Indices are independent. Hence, before applying chow and cointegration test all the selected series are checked for the unit root. ADF unit root test is used to check whether the series are stationary at first difference (Table I).

Table I: ADF –test

		KSE-100 t-Statistic	Prob.*	KMI-30 t-Statistic	Prob.*	KSE-30 t-Statistic	Prob.*
ADF -test- statistic		-10.74	0.0000	-11.3343	0.0000	-12.053	0.0000
C.R values	1% level	-3.4886		-4.04053		-4.04053	
	5% level	-2.887		-3.44972		-3.44972	
	10% level	-2.5804		-3.15013		-3.15013	

*MacKinnon (1996) one-sided p-values.

In order to confirm any long run relationship between the three stock markets as discussed earlier, Johansen cointegration technique is used which is considered of being the best time series econometrics technique for this purpose. Johansen cointegration test is applied on all three stock markets. If the trace value is greater than test statistics indicates no cointegration. Therefore, based on the trace and maximum Eigen value test statistics all the series have no cointegrated therefore they don't have long- run relationship, see tables II(a) and II(b).

Table II(a): Cointegration output Rank test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	Critical value 0.05	Prob**
KSE-100 with KMI-30				
None *	0.179233	36.82087	15.49471	0.0000
At most 1 *	0.110586	13.71150	3.841466	0.0002
KSE-100 with KSE-30				
None *	0.375315	70.55297	15.49471	0.0000
At most 1 *	0.124105	15.50362	3.841466	0.0001
		KMI-30 with KSE-30		
None *	0.283117	54.65891	15.49471	0.0000
At most 1 *	0.125696	15.71631	3.841466	0.0001

Trace test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table II(b): Cointegration output Rank test (Maximum Eigen value).

Hypothesized No. of CE(s)	Eigenvalue	Maximum Eigen value	Critical value 0.05	Prob**
		KSE-100 with KMI-30		
None *	0.179233	23.10937	14.26460	0.0016
At most 1 *	0.110586	13.71150	3.841466	0.0002
		KSE-100 with KSE-30		
None *	0.375315	55.04936	14.26460	0.0000
At most 1 *	0.124105	15.50362	3.841466	0.0001
		KMI-30 with KSE-30		
None *	0.283117	54.65891	15.49471	0.0000
At most 1 *	0.125696	15.71631	3.841466	0.0001

Max-eigenvalue test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Lastly, the time series are manually break into two parts based on the structural break. The structural breaks are compared as well. The only purpose of this is to explore the knowledge and a comparison of two parts of same data in different years. The verification of structural break has been done by the Chow test which is an econometric test to verify for the presence of a structural break. Chow test has been applied to find out the significance of cointegration amongst KSE 100, KSE 30 and KMI 30 Stock Market Exchanges. Coefficients show volatility after 2017 for all the three Stock Exchanges. In order to apply Chow test regression model for the series are developed, see table III.

Table III: Output of Chow break point test:

Equation Sample: 2009M07 2019M02

F-statistic	124.0251	Prob. F(1,114)	0.0000
Log likelihood ratio	85.39661	Prob. Chi-Square(1)	0.0000
Wald Statistic	124.0251	Prob. Chi-Square(1)	0.0000

For KSE-30

F-statistic	124.2871	Prob. F(1,114)	0.0000
Log likelihood ratio	85.52424	Prob. Chi-Square(1)	0.0000
Wald Statistic	124.2871	Prob. Chi-Square(1)	0.0000

For KSE-30

F-statistic	123.7170	Prob. F(1,114)	0.0000
Log likelihood ratio	85.24634	Prob. Chi-Square(1)	0.0000
Wald Statistic	123.7170	Prob. Chi-Square(1)	0.0000

Conclusion:

Comparing stock exchange market within an economy gives a clear account of market situations prevailing in different regions of a country helping traders, investors and general public to trade and invest for maximizing profits. In this light this piece of research investigated the relationship of all three indices of Pakistan Karachi Stock Markets namely; KSE-100, KSE-30 and KMI-30. From the time series trend observed it was found that all three stock exchange markets follow the same time series trend. Moreover, it was observed that at the start of 2009 all three stock markets picked up from very low i.e. 10,000 points to all time high for all indices in the beginning of the year 2017. KMI-30 was the leading stock exchange market with stocks going up as high as 80,000 points. Nonetheless KSE-100 and KSE-30 performed slightly above 40,000 points which showed that the economy was in good health.

All three stock exchange markets showed increasing and positive trend from 2009 to 2017. Socio-political and economic situations in Pakistan seem to influence the three stock exchange markets of Karachi to quite an extent. Political upheaval from the start of the first quarter of 2017 till the third quarter of 2017 shows downward trend in all three stock exchange markets. Somewhat the stock exchange markets picked from 2017 but it is at present showing mixed trend.

Cointegration method was employed to investigate the long-term relationship among these indices. Statistical analysis shows that no long-run relationship exists among the indices. This indicates that influence of one stock exchange market will not affect the other stock markets of Karachi due to diverse nature of business operations in stocks and shares. Structural changes were observed especially after mid of 2016 to 2017 and after that period all three depicted decline till date. The point to be noted is that due to robust nature of the economy of the country the Pakistan stock exchange market was able to withstand storms whether it be national political turmoil or international financial crises witnessed in foreign stock exchange markets.

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