EXAMINING RELATIONSHIP BETWEEN PAKISTAN STOCK EXCHANGE AND BOMBAY STOCK EXCHANGE

(A CO-INTEGRATION APPROACH)

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ABSTRACT

International cross listing has enlarged the interest of academics and investors to the subject of co- movement among the stock markets of the world. This study inspects the co integration of Pakistan stock exchange (KSE 100 index) with Bombay stock exchange (BSE 100 index). Daily data of both stock exchanges are collected from 2000 to 2014. Unit root test, Johansen Co-integration test and Engle- Granger tests are used for the data analysis. Results depict that there is no co-integration between the two selected exchanges. The study suggests that investors in Pakistan, may not diversify their risk by selecting in the Bombay equity market and also they may not enjoy benefits of diversification rather than investing in other countries outside Asian region. Also the Indian investors may not maximize their wealth by investing in Pakistani equity market.

Keywords: Co integration, Pakistan stock exchange, Bombay stock exchange, Unit root

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1. INTRODUCTION

1.1   Overview of the study

The flow of the capital across the international boarders in the international markets has been increased manifold due to the globalization and reduction in the restriction of international funds flow and the trading facilities in the financial markets in the different parts of the world. Due to the boost in the combination of markets the today's economic system turns out to be more related and interdependent to each other over time. The need is to understand the link of information from these financial markets and its importance in the financial decisions especially in relation to risk management and investment decisions. The financial managers of the firms are looking for those securities which are not related for significant investment opportunities to avoid risk. To study the co integration among the world's different markets is an important step because it is the significant measure of globalization and its importance for the investors to take investment decisions. The level of co integration among the stock markets is important for the international portfolio diversification and the country's financial stability. The co integration of the different markets shows that the different markets are related to each other and they possess fewer benefits from the diversification of portfolio across the borders.

Capital market has been considered as the major pillar for the country's economic growth in both developed and developing economies. Along with other important functions, the most significant function of capital market is to channelize the saving into investment (Sudhahar & Raja, 2010). The capital markets also play significant role in the allocation of resources into the productive operations in the economic system of a country. The allocation of resources can take place with the help of setting appropriate pricing for the securities traded in the capital markets. The investors in any economy can be motivated to invest in the capital markets of the country in only case when the securities in that market are appropriately priced. The market is said to be the efficient markets when the securities trading in that market reflects all the available information. In short, the dissemination of the

information can determine the market efficiency. How quickly and accurately reflecting the information by the securities trading in the market shows the degree of market efficiency. The conclusion is, capital markets have been considered as the vital tools that encourage the economic growth of the country, and many parties like investors are interested in the market efficiency.

The current study is carried out to check the long run relationship between Karachi Stock Exchange and Bombay Stock Exchange, and also the strength of relationship. Whenever the stock markets have relationship, the investors always take certain measures to get return on their investment. The previous studies showed that the stock market have long run relationship but failed to provide enough opportunities for investors to earn. The current study aims at achieving the following objectives

- To explore the long run relationship between KSE and BSE.
- To determine whether or not these two stock markets affects each other?

2. LITERATURE REVIEW

Literature offers many studies intended for exploring interdependence involving different equity markets intended for providing possibilities to worldwide investors to make well and useful diversified portfolios. However the literature offers inconsistent results about integration involving markets. For the reason that from the methodological dissimilarities and as well because of the big difference in data i.e. daily, week and monthly. Some of the studies in this regard are as under.

Islam et al. (2005) researched markets, involving Malaysia, Singapore and India, when it comes to exploring associations in equity markets. In order to check out dynamics the equity markets that they employed multivariate technique involving co integration. The actual causality has been studied by using the granger causality examination. Their study is dependent on equity rates involving daily data taken from July 1st, 1997 to Feb, 2005. Their results pointed to unidirectional flow via Singapore equity market to Malaysian equity market. Even though some other market have been discovered bi-directional flow.

Ismail et al. (2009) created an endeavor to check out Asia equity markets having well-established market of US. They've employed four markets; Hong Kong, Southern region Korea, Malaysia and India. Their study can be performed by utilizing regular monthly indices via 1996 to 2008. The researchers discovered the research involving relationship of US market having Asia by using the studies involving VAR model.

Sharma & Mahendra (2010) completed a study to evaluate the long-term relationship among BSE and Macro-economic variables (exchange rates, foreign exchange reserves, and inflation rate and gold price) to the time period from January 2008 to January 2009 employing a number of regression model. The study shows that exchange rate and gold value has an impact on stock prices in India.

The actual Asia emerging equity markets has been researched intended for integration while using the equity market US by Sharma (2011). She employed co integration intended for exploring association among most of these equity markets. Her results proved that the

emerging markets are motivated with the US market. Hence the emerging market investors cannot generate advantage by simply paying for US market.

The actual integration involving Pakistan market while using the various combine establishments has been researched by Ali et al. (2011). The researcher employed developed market of us, Asia, UK and Bangkok and other markets India, Indonesia, Singapore, Malaysia and Indonesia for this specific purpose. The actual regular monthly data taken from 1998 to 2008 have been studied by using the co integration studies. The researcher discovered the equity market involving Pakistan isn't integrated with equity markets of Singapore, UK, US, Malaysia and Taiwan.

Le Thai-Ha et al. (2011) have conducted a survey to investigate associations between the rates involving a couple of ideal products, that is, gold and oil with regards to index of US dollar by utilizing regular monthly data from January, 1986 to April, 2011 with the use of Financial econometrics. Empirical results of the research demonstrated that there is long-run relationship exists between the rates involving oil and gold and oil value can often estimate gold value.

Hosseini et al. (2011) studied relationship among equity markets indices and four macroeconomics factors, namely crude oil value, money resource, industrial output and inflation rate in China and India employing yearly data among January 1999 and January 2009. The study point out that there are both long and short run linkages among macroeconomic variables and equity markets index in each of these two countries.

Sarfaraz et.al (2012) researched interrelationship involving KSE 100 Index having main southern Asia exchanges. Many researchers used Enger granger technique intended for Co integration research. The results reveal KSE 100 Index has co integrated having BSE (30 Index) however there isn't a Co integration among KSE 100 Index and KOSPI. In the same manner there isn't Co integration among KSE 100 index and FTSE.

In the light of the above discussion, the following hypotheses have been formulated.

H_{01}:   There is no long run relationship between Pakistan stock exchange and Bombay stock exchange.

H_1:   There is a long run relationship between Pakistan stock exchange and Bombay stock exchange.

3. METHODOLOGY

This research is being conducted to find the relationship between Pakistan Stock Exchange (Formerly known as Karachi Stock exchange) and Bombay Stock Exchange. The study is based on finding the long run relationship between these two exchanges by co-integration approach. For this purpose, convenient sampling technique is used for the selection of Karachi Stock Exchange (KSE) and Bombay Stock Exchange (BSE) as a sample of the study. KSE 100 index has been used as a benchmark for Pakistan Stock exchange (PSX) while BSE 100 index has been used as a representative of Bombay Stock Exchange (BSX). The secondary data of daily closing indices has been collected from different sources like business recorder, yahoo finance, PSX and BSX official websites, for the period 1st January, 2000 to 31st December, 2014.

The Daily closing index values has been used to calculate daily return. Market return (R_t) is calculated from the following:

$$R_t = L_n(PI_t / PI_{t-1})$$

Where, R_t= market return at period t; PI_t= price index at period t; PI_{t-1} the price index at period t-1; L_n = Natural log.

The time series data is checked for the presence of unit roots with the help of Augmented Dickey Fuller test (ADF). Moreover, the presence of co integration has been tested with the help of Engle- Granger and Johansson approaches. All the analysis has been assisted by the Statistical package STATA 12.

4. DISCUSSION

4.1 Unit root test

The table below (4.1) shows a summary of ADF tests performed for the unit roots in data. It is well clear from the table that both KSE and BSE are not stationary at level, however these are stationary at first difference I(1) as shown by their p values i.e., 0.000 for both BSE and KSE. The test statistics -53.056 for BSE and -49.996 for KSE also confirm that both these are stationary at first difference.

Table 4.1 ADF test results

At Level			
Variable name	**Test statistics**	**Critical Value At 5% level of significance**	**Significance (p values)**
BSE	-0.472	-2.860	0.897
KSE	2.043	-2.860	0.998
At first Difference			
BSE	-53.056	-2.860	0.000
KSE	-49.996	-2.860	0.000

4.2 Engle-granger Co integration test

The co integration between the two exchanges has been tested with two approaches such as Engle and Granger (1987) and Johansen & Juselius (1990). The Engle- granger procedure involves a few steps to perform. First a regression is performed between the two indices, followed by an error prediction. In the next step, the difference of predicted error is regressed over the first lag value of error and the first lag of difference of predicted error. Table 4.2 (a) shows the regression results when BSE is regressed over KSE. It can be seen from the table 4.2 (a) that KSE and BSE are positively correlated with each other as depicted

by their coefficient signs. Moreover, KSE has a significant impact on BSE as shown by the p value i.e., 0.000.

Regression result table 4.2 (a)

```
. reg bse kse

    Source |       SS       df       MS              Number of obs =    3330
           |                                         F( 1,  3328) =11484.63
     Model | 9.3448e+09      1  9.3448e+09           Prob > F      = 0.0000
  Residual | 2.7079e+09   3328  813680.622           R-squared     = 0.7753
           |                                         Adj R-squared = 0.7753
     Total | 1.2053e+10   3329  3620530.56           Root MSE      = 902.04


       bse |     Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]

       kse |  .2994698   .0027944   107.17   0.000     .2939908    .3049488
     _cons |  776.1091   28.94726    26.81   0.000     719.3529    832.8654
```

Now the question that is BSE and KSE co integrated can be explained with the help of table 4.2 (b). In this table, the difference of predicted error is regressed over the first lagged value of error and the first lag of difference of predicted error. Here the null hypothesis states that no co integration exists between the two selected variables. In this regression, we cannot use the traditional p or t values for the rejection of null hypothesis; rather we have to consult the critical values provided by Engle and granger. The critical value for 't' provided by Engle and Granger at 5% level of significance is -3.37. Now if the t value of L1 is less than the Engle- Granger critical value of t, then the null hypothesis of no co integration is rejected and it is concluded that there exist co integration between the two variables. Comparing the t value of L1 i.e. -1.78 with the critical value of t i.e., -3.37, one can clearly observe that the L1't' value is greater than the critical value of 't' provided by Engle- Granger. Hence the null hypothesis cannot be rejected and it is concluded that no co integration exist between BSE and KSE.

Table 4.2 (b)

```
. regress d.rhat l.rhat l.d.rhat

      Source |       SS       df       MS              Number of obs =    3328
-------------+------------------------------           F(  2,  3325) =    9.37
       Model | 83721.9329       2  41860.9665           Prob > F      =  0.0001
    Residual | 14854031.2    3325  4467.37781           R-squared     =  0.0056
-------------+------------------------------           Adj R-squared =  0.0050
       Total | 14937753.1    3327  4489.85667           Root MSE      =  66.838


      D.rhat |     Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        rhat |
         L1. | -.0022967   .0012869    -1.78   0.074    -.0048198    .0002264
         LD. |  .0696558   .0173117     4.02   0.000     .0357132    .1035983
             |
       _cons | -.6943361   1.158674    -0.60   0.549    -2.966123    1.577451
```

4.3 Johansen Co integration test

Johansen & Juselius (1990) also provides a mean for the detection of co integration between two or more series. It is a maximum likelihood forecasting procedure that uses two statistics i.e., trace statistics and maximum Eigen values. The first step in performing Johansson test is to identify the optimum lag level for co integration test. For this purpose, varsoc test is performed and the output is shown in table 4.3 (a). In the table the Akaike information criteria (AIC) suggests the use of 2 lags for the Johansson co integration test. Other criterions such as HQIC and SBIC also confirm the use of 2 lags.

Table 4.3 (a) Lag selection

```
. varsoc bse kse

   Selection-order criteria
   Sample:  5 - 3330                               Number of obs      =     3326

  +---------------------------------------------------------------------------+
  | lag |    LL      LR      df    p     FPE      AIC      HQIC      SBIC      |
  |-----+---------------------------------------------------------------------|
  |  0  | -60771.8                     2.5e+13  36.5447   36.546    36.5483    |
  |  1  | -39113.2   43317    4  0.000  5.6e+07  23.5233   23.5272   23.5343   |
  |  2  | -39065.7   95.087   4  0.000  5.5e+07* 23.4971*  23.5037*  23.5155*  |
  |  3  | -39064.4   2.5337   4  0.639  5.5e+07  23.4988   23.508    23.5245   |
  |  4  | -39058.4   12.076*  4  0.017  5.5e+07  23.4975   23.5094   23.5306   |
  +---------------------------------------------------------------------------+

   Endogenous:  bse kse
    Exogenous:  _cons

.
```

Having confirmed with the lag level, the Johansson co integration test has been performed. As explained earlier it takes the use of two statistics such as trace statistics and Eigen values. According to Johansson, if the trace statistics is less than the critical value that will be the maximum rank of the test; while the maximum rank shows the number of co

integrating equations between the two or more series. Looking at the table 4.3 (b), it can be observed that the trace statistics (5.828) in the first row is less than the critical value (15.41) and the maximum rank is 0. Hence it can be said that there is no co integration between the two series.

Table 4.3 (b) Johanson Co integration test

```
. vecrank bse kse, trend(constant)

                        Johansen tests for cointegration
Trend: constant                                      Number of obs =    3328
Sample:  3 - 3330                                            Lags =       2
─────────────────────────────────────────────────────────────────────────
                                                     5%
maximum                                   trace    critical
  rank    parms         LL      eigenvalue statistic   value
    0       6      -39090.777         .       5.8287*   15.41
    1       9      -39088.853     0.00116     1.9805    3.76
    2      10      -39087.863     0.00059
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5.   Conclusion & Recommendations

The study is being conducted to find out the co integration among the Karachi Stock Exchange and Bombay Stock Exchange. South Asian market is taken as a population of the study. KSE and BSE are taken as a sample of the study. The data is collected from 2000 to 2014. The data is collected from the web sites of KSE and BSE and also from Yahoo finance and business recorder. The study applied different approaches to achieve its objectives. The Engle- granger approach is used to see if there is co integration between KSE and BSE. The findings of the test show that there is no co integration between KSE and BSE; In order to be more sure about the results of Engle and granger, the Johansson co integration test has been performed. The results of Johansson test also confirmed the presence of no co integration; hence the hypothesis formulated in the first section of this study is rejected and it is concluded that there is no co integration between KSE and BSE

The study has a practical implementation for different users. For instance, investors in Pakistan can diversify their risk by selecting in the equity market of selected countries and can enjoy benefits of diversification in regional equity markets rather than investing in other outside Asian region. Also the other South Asian countries investors can maximize their wealth by investing in Pakistan equity market.

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