MACROECONOMIC VARIABLES AND STOCK MARKET LIQUIDITY: THE CASE OF PAKISTAN STOCK EXCHANGE

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ABSTRACT

Stock markets are significant channels for escalating economic growth and a flourishing financial sector of a country. Numerous research studies have been investigated on the causal relationship between macro-economic indicators and stock market liquidity. But with reference in Pakistan, only few studies can be traced in literature. The aim of this research study is to scrutinize the causal relationship between macro-economic indicators and stock market liquidity in Pakistan. The 26 years’ Time series data from 1990 to 2016 have been used to investigate the relationship between various macro-economic indicators and stock market liquidity in Pakistan. The exchange rate, inflation, Interest rate and industrial production growth rate represent Macroeconomic indicators whereas the stock market liquidity have been signified by the Stock Market turnover of the Pakistan Stock Exchange. The result has been found through E-view 9 statistical software. There are statistical techniques; Augmented Dickey Fuller test, Johansen’s co-integration and Granger’s causality test employed to check either the data is stationary or non-stationary and to find relationship between these macro-economic variables on Stock Market liquidity position in Pakistan. This study concluded that only industrial production growth rate and Interest Rate have co-integration with stock liquidity at 5% level of significance. However, exchange rate and inflation rate are shown no co-integrated with stock market liquidity in Pakistan. Hence, the two macroeconomic indicators namely IPGR and INT have a long run association with Stock market liquidity in Pakistan. While, the other macroeconomic indicators INF and EX have no long run association with Stock liquidity.

Keywords: Financial Markets, Stock Market Liquidity, Macroeconomics and Time Series Data.

JEL Classification: E43, E44, C22, C58.

1. INTRODUCTION

Financial sector is a pivotal growth enhancing channel for a country and stock exchange is an essential ingredient of a financial sector. Stock markets can act as an important catalyst for promoting economic growth of a country. An efficient stock market is crucial for economic growth. Development of stock markets significantly affect the economic growth of Pakistan.¹ A well-developed stock market can enhance the economic growth in long run.²

Three stock exchanges are functioning in Pakistan, namely: Karachi, Islamabad and Lahore Stock exchange. Karachi stock exchange is the biggest of three and is escalating the economy by providing investment opportunities for local as well as for the foreign investors. Hence, stock exchange can push the economy by acting as a source of capital formation.³

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For trading systems and stock exchanges, liquidity is important. Liquidity is essential for attracting order flow and listings. A market is considered as liquid, if the traders can buy or sell shares quickly in large amount without influencing the price. 4

Stock market liquidity is mainly an evidence of its efficiency. Illiquidity in markets is a symptom of inadequate market functioning which can lead to a financial crisis. Measurement of liquidity is an important question need to be answered. Four dimensions are important in this respect. (1) Trading Time – the ability of executing a transaction immediately at prevailing price. (2) Tightness – buying or selling an asset at same time and same price. (3) Depth – the ability of buying and selling a certain amount of an asset without influencing the quoted price. (4) Resiliency – The ability of buying and selling a certain amount of an asset with least effect on quoted price.

Performance of stock markets in Pakistan is affected by political, economic and legal factors. Policies of central bank influence the liquidity of stock markets. Macroeconomic policies may also affect the stock exchanges in Pakistan. Studies suggest that macroeconomic indicators are responsible for stock market movements.

The purpose of this paper is to explore the impact of macroeconomic variables on stock exchange liquidity in Pakistan. The paper is organized in six sections. Section 1 consist of Introduction or Background of this research study. Section 2 is described the performance of Karachi stock Exchange. Section 3 comprises of literature review. Section 4 contains methodology and modeling framework. Results and conclusion are represented in Section 5 and 6 respectively.

1.1 Research Question

How dynamics of stock market liquidity can be inquired by macroeconomic determinants?

1.2 Research Objective

The aim of this research study is to scrutinize the causal relationship between macro-economic indicators and stock market liquidity in Pakistan. The 26 years’ Time series data from 1990 to 2016 have been used to investigate the relationship between various macro-economic indicators and stock market liquidity in Pakistan. The, exchange rate, inflation, Interest rate and industrial production growth rate represent Macro-economic indicators whereas the stock market liquidity have been signified by the Stock Market turnover of the Pakistan Stock Exchange.

2. PERFORMANCE OF KARACHI STOCK EXCHANGE

There are three stock markets namely Karachi stock exchange, Lahore stock exchange and Islamabad stock exchange operated in Pakistan. KSE is the largest stock market among them according to market capitalization and share price.

Karachi stock exchange is the largest and most liquid exchange of Pakistan established on September 18, 1949. It has been declared as the “Best performing Stock market of the world” in 2002 by Business Week. There are 602 companies listed on KSE with a market capitalization of Rs.5.22 trillion.\(^5\)

Foreign interest in KSE was very active till 2007. Fluctuations were seen from beginning of 2007. Karachi stock exchange has shown a rapid growth in last two decades. In 2015, The KSE was listed Among 10 Best stock Markets in the World in the year of 2015.\(^6\) According to the Bloomberg, The KSE was the Third Best Performer Market since 2009.\(^7\) In January 2016, the all three Stock markets in Pakistan ware integrated as Pakistan Stock Exchange. Now, January 26, 2016, there are 558 companies listed in PSX and the total market capitalization is $95billion.\(^8\)

3. LITERATURE REVIEW

Several studies have taken place previously to explore different aspects of stock markets. The research studies of have discussed the casual relationship between stock liquidity and macroeconomic indicators regarding Pakistan.\(^9\)\(^10\)\(^11\) Though these studies have also found dissimilar results. This study consists of most recent data to analyze the casual association between Stock liquidity and macro-economic indicators in Pakistan.

The study of investigated the impact of stock market development on economic growth for Pakistan and Bangladesh. They found that the stock exchanges of both countries have positive significant effect on economic growth.\(^12\) Market capitalization is also having strong influence on Pakistan’s economic growth. The examined the influence of stock market

\(^6\) Houreld, Katharine. 10 April 2013.
\(^7\) Bloomberg. 2015. "What's Next For Asia's Best-Performing Stock Market?"
development on economic growth of Nigeria.\textsuperscript{13} The findings showed that stock market liquidity influence the economic growth positively. The results further reflected that the size of market is not significant for the economic growth.

The research of studied the macroeconomic determinants of stock market performance in Pakistan.\textsuperscript{14} The results reflect positive effects of FDI and value-added trade on stock market performance. Banking sector development was found insignificant. The study of examined the macroeconomic and institutional determinants of stock markets. The study analyzed a panel data of 42 emerging economies.\textsuperscript{15} The findings suggest law & order, political risk and bureaucratic quality as important determinants of stock market development.

The impact of macroeconomic variables on stock exchange of Amman and found positive significant influence of money supply, total value traded, gross capital formation, CPI and credit to private sector.\textsuperscript{16} They found negative impact of Nominal Gross Domestic Product and Net Remittances on stock market development.

The research of investigating the impact of domestic macroeconomic variables and world stock market on the domestic financial markets of ASEAN nations.\textsuperscript{17} The results reflect that economic growth, interest rate and exchange rates affect the domestic financial markets of these countries significantly influence the domestic financial markets

Studying the situation of liquidity at Karachi stock exchange.\textsuperscript{18} By using liquidity analysis, turnover ratio and size of market as liquidity determinants they concluded that stock market was less liquid during 1985 – 2006. Karachi stock market is still lagging in liquidity and hence isn’t efficient enough to attract investors.

Furthermore, the impact of macroeconomic variables on stock exchange prices, oil prices, terms of trade, rate of interest, industrial production index and money supply were co-integrated with stock exchange of USA, Japan and China.\textsuperscript{19} The findings suggest that interest rate, industrial production index and money supply are positively related to stock exchange of China and USA both in long and short run. Money supply in Japan has positive impact in long run while in


\textsuperscript{14} Zafar, Mehrish. 2013. "Determinants of Stock market performance in Pakistan." \textit{IJCRB Vol. 4, No. 9, 2013}.


short run it has negative effect on stock exchange. Interest rate in Japan positively and highly significant in long run and industrial production index has insignificant but positive relation with stock exchange prices. Moreover, the stock prices and exchange rate relationship on India, Pakistan, Bangladesh and Sri Lanka. It concluded that there exists no long run relationship between stock prices and exchange rate for India and Pakistan while bi-directional relation exists in Sri Lanka and Bangladesh. No short run relation was found in short run in all four South Asian countries. A Research investigated the impact of inflation on Egyptian stock market performance. The results reflect significant impact of inflation on stock market performance both in long and short run.

The relation between stock market volatility and real, nominal macroeconomic volatility, financial leverage and economic activity was also analyzed that stock exchange was highly volatile during Great Depression. Significant correlation between leverage and stock exchange volatility was found.

4. METHODOLOGY

The Core purpose of this study is to analysis the effects of Macro-economic indicators on Stock market liquidity in Pakistan. This study acquires annul secondary data from the Statistical Bulletins of State Bank of Pakistan and Economic Surveys. The study Covered a period of 26 years of data ranging from 1990 to 2015. Exchange rate, Industrial Production Growth rate, Interest rate and inflation are taken as Macro-economic indicators. To measure the stock liquidity, Stock Turnover of Karachi Stock Exchange are taken as Proxy.

4.1. Research Techniques:

To achieve research objective of this study, Firstly Descriptive statistics was conducted to check the descriptive analysis of these variables. After that Unit Root Test (Augmented Dicker Fuller test) was applied to check either the data was stationary or non-stationary. Granger Causality test and Johansen’s Co-integration techniques are used to measure the impact of above mentioned explanatory variables on Stock Market Liquidity in Pakistan. Furthermore, to check the co-integration between the variables, The Johnsen’s co-integration technique was used. In the end, the Granger Causality test

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was used to scrutinize the contributing relationship between the Macro-economic indicators and stock market liquidity in Pakistan stock Exchange. All the statistical analysis for this study is occupied from E-Views Software 9.

4.2 Model Estimation

Where:
SLQ = Stock Market Liquidity
EX = Exchange rate
INT = Interest Rate
INF = Inflation
IPGR = Industrial Production Growth Rate

5. RESULT ESTIMATION

5.1 Descriptive Analysis

Table 5.1: Descriptive Statistics

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
<th>SLQ</th>
<th>EX</th>
<th>IPGR</th>
<th>INT</th>
<th>INF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>6475.98</td>
<td>57.41</td>
<td>4.47</td>
<td>6.16</td>
<td>244.06</td>
</tr>
<tr>
<td>Median</td>
<td>3353.30</td>
<td>58.46</td>
<td>3.55</td>
<td>6.38</td>
<td>234.20</td>
</tr>
<tr>
<td>Maximum</td>
<td>40194.80</td>
<td>102.85</td>
<td>13.10</td>
<td>10.66</td>
<td>439.43</td>
</tr>
<tr>
<td>Minimum</td>
<td>742.56</td>
<td>21.44</td>
<td>-1.90</td>
<td>1.32</td>
<td>100.00</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>9454.85</td>
<td>25.28</td>
<td>3.11</td>
<td>2.31</td>
<td>104.72</td>
</tr>
<tr>
<td>Skewness</td>
<td>2.405</td>
<td>0.29</td>
<td>0.85</td>
<td>-0.48</td>
<td>0.214</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>8.128</td>
<td>2.03</td>
<td>4.12</td>
<td>2.69</td>
<td>1.80</td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>53.55</td>
<td>1.37</td>
<td>4.51</td>
<td>1.13</td>
<td>1.753</td>
</tr>
<tr>
<td>Probability</td>
<td>0.00</td>
<td>0.50</td>
<td>0.10</td>
<td>0.566</td>
<td>0.41</td>
</tr>
<tr>
<td>Sum</td>
<td>168375.6</td>
<td>1492.86</td>
<td>116.30</td>
<td>160.38</td>
<td>6345.78</td>
</tr>
<tr>
<td>Sum Sq.Dev.</td>
<td>2.23E+15</td>
<td>15980.13</td>
<td>242.45</td>
<td>133.67</td>
<td>274199.2</td>
</tr>
<tr>
<td>Observations</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>26</td>
</tr>
</tbody>
</table>

The above-mentioned Table I represent the result of descriptive statistical analysis of specific explanatory and response variables in this study. The result quantified that stock liquidity has the mean of Rs. 6,476. During the study period, the range of Stock liquidity in Pakistan was Rs. 742 to 40,195 with standard deviation of Rs. 9454. The Exchange Rate has mean Rs. 57.4. The range was between Rs. 21.4 to Rs. 102.8 with standard deviation 25.2. Furthermore, Industrial production growth rate has mean 4.4%. was Rs. 742 to 40,195 with standard deviation of Rs. 9454. The Exchange Rate has mean Rs. 57.4. The range was between -1.90% to 13.1% with standard deviation 3.1%. The mean of inflation and interest rate were Rs. 244 and 6.1% with standard deviation Rs. 104.7 and 2.3% respectively.
5.2 Augmented Dicky Fuller Test

To investigate the stationarity of this time series data set, the Augmented Dickey Fuller test was applied. The given below Table II showed the result of ADF test which is originated from E-View Software. According to result, the all variables are stationary at 1st difference level with intercept test equation. The Critical value are restrained at 5% level of confidence.

Table 5.3: Stationarity Table (ADF Test)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Critical Value At 5%</th>
<th>ADF Test Statistics</th>
<th>Probability</th>
<th>Result</th>
<th>Critical Value Less than 5%</th>
<th>ADF Test Statistics</th>
<th>Probability</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLQ</td>
<td>-2.98</td>
<td>-2.33</td>
<td>0.17</td>
<td>Non-Stationary</td>
<td>-2.99</td>
<td>-5.22</td>
<td>0.003</td>
<td>Stationary</td>
</tr>
<tr>
<td>EX</td>
<td>-2.98</td>
<td>0.35</td>
<td>0.97</td>
<td>Non-Stationary</td>
<td>-2.99</td>
<td>-4.10</td>
<td>0.004</td>
<td>Stationary</td>
</tr>
<tr>
<td>IPGR</td>
<td>-2.98</td>
<td>-2.46</td>
<td>0.13</td>
<td>Non-Stationary</td>
<td>-2.99</td>
<td>-6.30</td>
<td>0.000</td>
<td>Stationary</td>
</tr>
<tr>
<td>INT</td>
<td>-2.99</td>
<td>-1.2</td>
<td>0.62</td>
<td>Non-Stationary</td>
<td>-2.99</td>
<td>-4.10</td>
<td>0.004</td>
<td>Stationary</td>
</tr>
<tr>
<td>INF</td>
<td>-2.98</td>
<td>-1.6</td>
<td>0.45</td>
<td>Non-Stationary</td>
<td>-2.99</td>
<td>-4.6</td>
<td>0.0011</td>
<td>Stationary</td>
</tr>
</tbody>
</table>

Table 5.3: Johansen CO-Integration Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>Eigen Value</th>
<th>Trace Statistics</th>
<th>Critical Value 5%</th>
<th>Probability</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPGR</td>
<td>0.851</td>
<td>98.05</td>
<td>69.8</td>
<td>0.001</td>
<td>None*</td>
</tr>
<tr>
<td>INT</td>
<td>0.696</td>
<td>52.31</td>
<td>47.8</td>
<td>1.018</td>
<td>At most 1*</td>
</tr>
<tr>
<td>INF</td>
<td>0.467</td>
<td>23.72</td>
<td>29.79</td>
<td>0.212</td>
<td>At most 2</td>
</tr>
<tr>
<td>EX</td>
<td>0.301</td>
<td>8.61</td>
<td>15.49</td>
<td>0.402</td>
<td>At most 3</td>
</tr>
<tr>
<td>SLQ</td>
<td>7.57</td>
<td>0.0018</td>
<td>3.8</td>
<td>0.963</td>
<td>At most 4</td>
</tr>
</tbody>
</table>

* Means rejection of Null hypothesis at 5% level of significance

5.3 Johansen CO-Integration Analysis

The above-mentioned literature suggests that if the times series data is stationary at 1st difference level, the researcher ought to analyze result with Co-integration analysis. The Co-integration analysis basically used to gauge the connection between the variables at long run. According to the research methodology of this paper, the Johansen approach is appropriate because it is an approach to measure the long run relationship between more than two variables. Thus, this study has been used Johansen Co-integration technique. According to result of this test the researcher found that only industrial production growth rate and Interest Rate have co-integration with stock liquidity at 5% level of significance.
However, exchange rate and inflation rate are shown no co-integrated with stock market liquidity in Pakistan. Hence, the two macroeconomic indicators namely IPGR and INT have a long run association with stock market liquidity in Pakistan. While, the other macroeconomic indicators INF and EX have no long run association with stock liquidity. Although the study of found in their study that inflation has also positively co-integrated with stock market liquidity.  

**5.4 Granger Causality Test**

The Granger causality model is basically examined the causativeness between the two variables in time series data. This model is estimated by Clive Granger in 1969. The regression analysis simply scrutinize the correlation among the variables but this model, has capacity to forecast the future value of one-time series by using previous value of other time series. 

The Table IV in this study represent the analysis of Granger Causality Test. The probability result between both is 0.0006. This result suggested that there is a Granger Causality between stock liquidity and Exchange rate in Pakistan. There is no Granger Causality between stock liquidity and Inflation rate. Furthermore, there is no Granger causality between stock liquidity and Interest rate in Pakistan. Moreover, there is Granger Causality occur in stock liquidity and Industrial Production Growth Rate in Pakistan. The study investigated causal relationship between macro-economic variables and stock market price during the period of 2005-2008. The study was concluded that Exchange rate and Industrial production growth rate have Causal association with stock market in Pakistan during the period of 2005-2008. The difference between these findings is that during the period of 2003-2008, the stock market capitalization, share price and 100 index volumes were at peak as it is before. The economic indicators were not showed significant improvements as camper to the stock market boom. And the industrial growth was also stagnant at that time. The study of also conclude the same results.  

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Table 5.4: Granger Causality Test

<table>
<thead>
<tr>
<th>Pairwise Granger Causality Tests</th>
<th>Obs.</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLQ does not Granger Cause EX</td>
<td>24</td>
<td>11.3391</td>
<td>0.0006</td>
</tr>
<tr>
<td>EX does not Granger Cause SLQ</td>
<td>0.73306</td>
<td>0.4935</td>
<td></td>
</tr>
<tr>
<td>SLQ does not Granger Cause INF</td>
<td>24</td>
<td>0.10403</td>
<td>0.9017</td>
</tr>
<tr>
<td>INF does not Granger Cause SLQ</td>
<td>0.82560</td>
<td>0.4531</td>
<td></td>
</tr>
<tr>
<td>SLQ does not Granger Cause INT</td>
<td>24</td>
<td>2.84867</td>
<td>0.0828</td>
</tr>
<tr>
<td>INT does not Granger Cause SLQ</td>
<td>6.05686</td>
<td>0.0092</td>
<td></td>
</tr>
<tr>
<td>SLQ does not Granger Cause IPGR</td>
<td>24</td>
<td>8.39854</td>
<td>0.0024</td>
</tr>
</tbody>
</table>

6. CONCLUSION AND IMPLICATIONS

The aim of this research study is to scrutinize the causal relationship between macro-economic indicators and stock market liquidity in Pakistan. The 26 years’ Time series data from 1990 to 2016 have been used to investigate the relationship between various macro-economic indicators and stock market liquidity in Pakistan. The exchange rate, inflation, Interest rate and industrial production growth rate represent Macro-economic indicators whereas the stock market liquidity have been signified by the Stock Market turnover of the Pakistan Stock Exchange. There are statistical techniques; Augmented Dickey Fuller test, Johansen’s co-integration and Granger’s causality test employed to check either the data is stationary or non-stationary and to find relationship between these macro-economic variables on Stock Market liquidity position in Pakistan. This study concluded that only industrial production growth rate and Interest Rate have co-integration with stock liquidity at 5% level of significance. However, exchange rate and inflation rate are shown no co-integrated with stock market liquidity in Pakistan. Hence, the two macroeconomic indicators namely IPGR and INT have a long run association with Stock market liquidity in Pakistan While, the other macroeconomic indicators INF and EX have no long run association with Stock liquidity.

The research study concluded that there is no Granger Causality between Stock liquidity and Inflation rate. Furthermore, there is no Granger causality between Stock liquidity and Interest rate in Pakistan. Moreover, there is Granger Causality occur in Stock liquidity and Industrial Production Growth Rate in Pakistan.

Although the study of Ali (2010) found in their study that inflation has also positively co-integrated with stock market liquidity. Based on result findings, the study conclude that Pakistan Stock Exchange liquidity position do not have causal
associated with all macro-economic indicators. Hence, there are others market indicators like market efficiency, Economic condition of the country, low lending rate and well-organized recovery of outstanding loans of financial sector, payment of foreign debts, positive FDI inflows and favorable policies for investment environment in the country laid positive impact on Stock market liquidity in Pakistan.

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Houreld, Katharine. 10 April 2013.