

Long Run Association and Causality between Macroeconomic Indicators and Banking Sector in Pakistan

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Abstract: The study investigated the long run relationship between selected macroeconomic indicators and banking sector index in Pakistan. The selected macroeconomic indicators are Exports, Industrial Production, CPI, KIBOR as short term interest rate, Money Supply (M0), Nominal Exchange Rate between Pakistan and United States of America (USA), Oil Prices and Interest rate on Pakistan Government bond 10 year, as long term interest rate. Monthly time series was used from January, 2009 to August, 2015. Study applied Augmented Dickey Fuller test to determine the stationarity levels for the selected macroeconomic indicators and banking sector index, Phillips-Perron test to validate the results of Augmented Dickey Fuller test, bound testing technique in ARDL model to investigate long run relationship between selected macroeconomic variables and banking sector index. Results suggested presence of long run relationship between macroeconomic variables exchange rate, inflation, oil price and banking sector index in Pakistan. Results of Granger causality test suggested unidirectional causality running from macroeconomic variables KIBOR and oil prices to banking sector index in Pakistan. Further, unidirectional causality was found running from banking sector index to government bond in Pakistan.

Keywords: ARDL, Phillips-Perron, ADF, Granger Causality, CPI, KIBOR.

I. INTRODUCTION

The Long run co-movement and Causal relationship between different macroeconomic variables and equity returns had been a centre of discussion for some recent time. The stock returns in any economy are considered to be susceptible to the changes in macroeconomic variables in the economy (Hasan & Javed, 2009). Owing to this fact, the examination of long run co-movement, short term relationship and causal relationship between macroeconomic variables and stock returns in Pakistan has become significant. This study used stock prices for banks listed at Karachi Stock Exchange (KSE). The study examined the long run co-movement, short run relationship and causal relationship between selected macroeconomic variables and stock returns for banks listed at KSE.

The stock market in Pakistan is volatile in nature (Attari & Safdar, 2013). In volatile stock markets, both the investors as well as the regulators needs to assess the situation by using different statistical tools in order to manage and minimize the risk associated with the investment in stock market (Ali, Rehman, Yilmaz, Khan, & Afzal, 2010). The study of long run equilibrium, short run relationship and causal relationship between macroeconomic variables and banking sector performance in Pakistan will help to assess the association and linkage among them. These examined association and linkages could be used to minimize the risk in future by the investors.

As per the ratings of International Monetary Fund (IMF), Pakistan has been categorized under the status of developing country (IMF, 2014). The study of linkage between Stock prices and macroeconomic variables is being carried out in developed, developing and under developed countries due to the significance of this topic. The macroeconomic variables used in this study are Stock prices for listed banks at KSE, Consumer Price Index (CPI) as measure of inflation, Exchange rate, Oil Prices, Exports Volume, Pakistan Government Bond Yield 10 year rate as a proxy for long term interest rate, Karachi Interbank Offer rate (KIBOR) as a proxy for short term interest rate, Industrial Production, Money Supply (M0) and Whole Price Index (WPI) as a proxy of inflation at Whole Sale market.

The main objectives of this study were to find out long run relationship between selected macroeconomic indicators and banking sector index in Pakistan and explore if there prevails unidirectional or bidirectional causality between macroeconomic indicators and banking sector in Pakistan.

There are a total of 26 banks registered at KSE under the banking sector of Pakistan. Out of these 26 banks registered at KSE, some of them are Islamic banks while some are Conventional banks. The study used the monthly data for these banks listed at KSE. Inflation is a macroeconomic variable which can be defined as a continuous gradual increase in prices and wages level (Shostak, 2002). This study utilizes the Consumer Price Index (CPI) method in order to measure the inflation prevailing in Pakistan. The method used by PBS for calculation of CPI is weighted Laspeyre's formula.

The calculation of CPI covers 40 cities of Pakistan and 76 markets in these 40 cities. The current CPI calculation in Pakistan uses 487 items in its basket of food and services. The study used data for CPI on monthly basis from monthly reports of PBS. The exchange rate can be defined as the rate of exchange for one national currency against another nation's currency (Piana, 2001). The study used monthly data of nominal exchange rate for analysis. This monthly data for nominal exchange rate was calculated by taking average of daily values for nominal exchange rate during the whole month. Money supply can be defined as the entire stock of money and liquid instruments in any country's economy (Umeora & Emmanuel, 2010). The study used the Money Supply (M0) in its analysis. M0 can be defined as the sum of all the coins and currency notes in circulation and other equivalents that can be readily converted into cash in short time.

Exports are a function of international trade in which goods manufactured in one country are shipped to another country for the purpose of sale or trade. This study used the variable exports as macroeconomic variable in the analysis. The industrial production is simply the total number of output produced by the Industrial sector of the economy within a specific period. The industrial production can be measured in terms of units as well as in terms of industrial production index. This research measured the industrial production in terms of numbers in output. The data from the World Bank for industrial production was based upon constant U.S dollar rate for 2010. KIBOR is simply an abbreviation of Karachi interbank offered rate. This is the average rate of interest at which the term deposits are offered between prime banks listed under the control of State Bank of Pakistan (SBP). The study used oil price of crude oil on monthly basis. The study used spot prices for crude oil in U.S Dollars per Barrel. The study included Pakistan investment bonds as one of the macroeconomic variables. Interest on Pakistan investment bonds was used as a proxy variable for long term interest rate in Pakistan.

There are a total of 25 banks listed at KSE in banking sector of Pakistan. Due to limitation of data, the study used those banks which have been listed at KSE since 2007. The timeline of study was from January, 2008 to August, 2014 which formulates a total of 80 months. The study included 78 months during this period excluding October and November of 2008. Reason for excluding these two months was that for most of banks listed at KSE, stock prices for these two months of 2008 were not present. There were 23 total commercial banks listed at KSE during the period January, 2008 to August, 2014. Out of these 23 commercial banks listed at KSE, 21 banks were taken into study for the calculation of banking index. Samba bank and Silk bank were not taken in this study for calculating the banking index as stock prices for these two banks were not available for most of the period from January, 2008 to August, 2014.

II. LITERATURE REVIEW

Haider (2013) conducted study to examine the relationship between selected macroeconomic variables and stock movement in KSE. Study conducted by Khan M. S. (2014) explored the impact of different selected macroeconomic variables on KSE-100 index in Pakistan. Mahmood, Waheed and Khalid (2014) conducted research to examine long run relationship between selected macroeconomic variables and banking crisis in Pakistan. Rasool and Hussain (2014) explored the impact of different selected macroeconomic indicators on stock prices at LSE. The selected macroeconomic indicators were exchange rate, foreign exchange reserves, Industrial production index, Interest rate, Imports, Money supply, Wholesale price Index and exports. The study investigated long run relationship as well as causality between selected macroeconomic indicators and stock prices at LSE.

The study conducted by Khan M. S. (2014) employed multiple regression technique to explore the impact of selected macroeconomic variables on KSE-100 index. The study further used Pearson's Correlation model in order to study the relationship between selected macroeconomic variables and KSE-100 index in Pakistan. Mahmood, Waheed and Khalid (2014) used Johansen's Co integration approach in order to examine long run relationship between selected macroeconomic variables and banking crisis in Pakistan. Rasool and Hussain (2014) applied Johansen Co integration technique in order to investigate long run relationship between selected macroeconomic indicators and stock prices at LSE. Study further employed Granger Causality test in order to identify the direction of causality between selected macroeconomic indicators and stock prices at LSE.

The results obtained from the study of Khan M. S. (2014) suggested that exchange rate, inflation and GDP possess positive relationship while interest rate possesses negative relationship with KSE-100 index in Pakistan. The study further found that exchange rate and inflation are significantly affecting the performance of KSE-100 index in Pakistan. The results of the study conducted by Mahmood, Waheed and Khalid (2014) provided evidence that there exists significant negative long run relationship between exchange rate and banking crisis in Pakistan. The growth rate also possess significant negative long run relationship with banking crisis in Pakistan while there is a positive relationship between inflation rate and banking crisis in Pakistan. Rasool and Hussain (2014) concluded in their study that there prevails causality from exports to stock prices at LSE. Study found exchange rate, money supply, and wholesale price index as negatively linked with stock prices at LSE in long run.

III. EMPIRICAL RESULTS

The study initially employed descriptive test on banking index and selected macroeconomic variables in order to identify the descriptive statistics of the time series included in study. The descriptive statistics helped to interpret the performance of the banking index and selected macroeconomic variables in a summarized manner. The results of descriptive test employed on the time series in study are shown on following page:

Table 1 Descriptive Analysis Result

Descriptive Analysis Result

Variables	Obs	Mean	Median	Std. Dev.	Skewness	Kurtosis	Jarque-Bera (Prob.)
Ind	78	999.6	1,001	7.42	-5.26	39.45	0.00
Bond	78	12.83	12.96	1.02	0.51	4.07	0.02
Exrus	78	87.75	85.95	11.06	-0.44	3.03	0.28
Exp	78	166,624	175,823	40,661	0.01	2.21	0.36
Inf	78	12.09	11.21	4.53	1.14	3.98	0.00
IP	78	2,716,826,812	2,635,372,063	275,232,923	0.59	-0.89	0.02
KIBOR	78	10.83	11.33	1.45	-0.17	1.67	0.04
Money	78	2,013,879	1,958,605	475,734	0.27	1.85	0.07
Oil	78	89.78	94.00	18.49	-0.60	4.06	0.01

The base value for banking index selected in this study was 1,000 points. The descriptive results suggest that the banking index during January, 2008 to August, 2014 stood at 999.6 points on average. This suggests that overall stock performance of banking sector during the selected period of study remained close to 1,000 points on average. The median value of banking index suggested that most of the time, the banking index closed at 1,001 points.

The study employed ADF test in order to identify the level of integration between the data. The investigation of level of integration in the data helps to identify the stationarity of the data (Nkusu, 2011). The data being used in the study for analysis should be stationary in nature as this is one of the basic assumptions of time series data to be linear (Palit & Popovic, 2006). Without stationary data in time series research, the results produced by linear models will be spurious or misleading (Downward & Dawson, 2002). The study also employed Phillips-Perron test (PP) in order to validate and confirm the results obtained from ADF test. The ADF and PP test are applied in order to investigate unit root in the data. If there is presence of Unit root in the data then that data is termed as non-stationary data while in absence of unit root in data, it is termed as stationary data.

In order to declare the time series stationary, it is required that the null hypothesis of unit root test is statistically not accepted (Kuijs & Borghijs, 2004). If the time series selected in the study are integrated of same order then the series can be tested for the prevalence of co integration between them (Wang & Fasano-Filho, 2002). The application of ADF test and PP test identified that all of the selected macroeconomic series and banking index are stationary between I (0) and I (1). This implies that the selected macroeconomic series and banking index are integrated at different levels like I (0) and I (1). The results of ADF test applied on the variables are shown in following table:

Table 2 Augmented Dickeyuller Test Result

Augmented Dickey Fuller Test Result

Variables	ADF with Intercept			ADF with Intercept and trend	
	Test Statistics			Test Statistics	
	At Level	At 1st Difference	At 2nd Difference	At Level	At 1st Difference
Index	-5.60***	-	-	-5.84***	-
Bond	-3.77***	-	-	-4.04**	-7.93***
Exchange Rate(U.S)	-2.86*	-6.56***	-	-1.89	-6.87***
Exports	-1.59	-10.13***	-	-2.72	-10.16
Inflation	-0.98	-5.82***	-	-3.73**	-5.84***
Industrial Production	1.25	-2.78*	-9.57***	-2.21	-7.57***
KIBOR	-2.04	-11.24***	-	-2.84	-11.36***
Money Supply (M0)	0.49	-11.35***	-	-3.80**	-11.35***
Oil Prices	-3.51**	-6.97***	-	-2.74	-7.46***

*Variable is significant at .10(10%) significance level

**Variable is significant at .05(5%) significance level

***Variable is significant at .01(1%) significance level

The ADF test was applied once with the presence of intercept and once with the presence of both intercept and trend in time series. The results of ADF test suggests that banking index and government bond are stationary with intercept at level against 10%, 5% and 1% significance level. The exchange rate with U.S is stationary with intercept at level against 10% significance level while oil prices is stationary with intercept at level against 10% and 5% significance level. Other variables which include exports, inflation, KIBOR and money supply all are stationary with intercept at 1st difference against 10%, 5% and 1% significance level. The industrial production is stationary with intercept at 1nd difference against 10% significance level while it is stationary with intercept at 2nd difference against 10%, 5% and 1% significance level.

The ADF test was also employed with the presence of intercept and constant both. The results depicts that banking index is stationary with intercept and constant at level against 10%, 5% and 1% significance level. Variables including government bond, inflation and money supply are stationary with intercept and constant at level against 10% and 5% significance level while they are stationary with intercept and constant at 1st difference against 10%, 5% and 1% significance level. Other variables which includes exchange rate with U.S, exports, industrial production, KIBOR and oil prices are stationary with intercept and constant at 1st difference against 10%, 5% and 1% significance level.

In order to verify the results obtained from ADF test, the study employed PP test to investigate the stationarity of the time series taken in the study. The results of PP test are as follows:

Table 3 Phillips-Perron Test Result

Phillips-Perron Test Result

Variables	PP with Constant		PP with Constant and trend	
	Test Statistics		Test Statistics	
	At Level	At 1st Difference	At Level	At 1st Difference
Index	-5.38***	-	-5.37***	-
Bond	-3.16**	-7.95***	-3.28*	-7.93***
Exchange Rate(U.S)	-2.50	-6.76***	-2.23	-6.99***
Exports	-2.33	-14.96***	-5.34***	-
Inflation	-1.66	-5.91***	-3.22*	-5.94***
Industrial Production	-3.09**	-8.09***	-3.57**	-8.07***
KIBOR	-1.84	-11.51***	-2.67	-11.87***
Money Supply (M0)	0.25	-11.81***	-3.69**	-11.94***
Oil Prices	-2.70*	-6.94***	-2.90	-6.90***

*Variable is significant at .10(10%) significance level

**Variable is significant at .05(5%) significance level

***Variable is significant at .01(1%) significance level

The application of ADF test and PP test identified that all of the selected macroeconomic series and banking index are stationary between I (0) and I (1). This implies that the selected macroeconomic series and banking index are integrated at different levels like I (0) and I (1). The result of PP test suggests that banking index is stationary with intercept at level against 10%, 5% and 1% significance level. The government bond and industrial production are stationary with intercept at level against 10% and 5% significance level while these two variables are stationary with intercept at 1st difference against 10%, 5% and 1% significance level. Oil prices are stationary with intercept at level against 10% while it is stationary with intercept at 1st difference against 10%, 5% and 1% significance level. All other variables exchange rate with U.S, exports, inflation, KIBOR and money supply are stationary with intercept at 1st difference against 10%, 5% and 1% significance level.

The PP test was also conducted with the presence of intercept and constant both. The result provides evidence that banking index and exports are stationary at level with intercept and constant against 10%, 5% and 1% significance level. Industrial production and money supply are stationary at level with intercept and constant against 10% and 5% significance level while they are stationary at 1st difference against 10%, 5% and 1% significance level. The government bond is stationary with intercept and constant at level against 10% significance level while they are stationary with intercept and constant at 1st difference against 10%, 5% and 1% significance level. Variables KIBOR, exchange rate with U.S and oil prices are stationary with intercept and constant at 1st difference against 10%, 5% and 1% significance level.

All the variables are integrated of order I(0) or I(1) as per the stationarity tests except industrial production. The variable industrial production is stationary at 2nd difference with intercept as per ADF test while it is stationary at 1st difference with intercept and constant as per ADF test. The PP test justified it by suggesting that industrial production is stationary at 1st difference with

intercept and constant. Thus, it is possible to use industrial production in ARDL approach by including both intercept and constant in it.

Before investigating the long run association between banking index and selected macroeconomic variables, the study identified the optimum lag order by employing lag selection criterion. The results of lag selection criterion are given in the following table:

Table 4 Lag Selection Criterion Result

Lag Selection Criterion Result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2427.81	NA	3.24	65.85	66.14	65.97
1	-1898.92	914.82	1.82*	53.75	56.55*	54.87*
2	-1824.27	110.96	2.36	53.92	59.25	56.05
3	-1726.35	121.73*	1.92	53.46	61.31	56.59
4	-1631.37	94.986	2.24	53.09*	63.45	57.22

*indicates the selected optimum lag order by using the criterion

LR: Sequential modified LR test statistics (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

In order to apply the lag order criterion, the study formulated VAR model for the banking index and selected macroeconomic variables. Later on, lag order criterion was employed on the results of VAR model. In lag order criterion, the study used 4 lag orders in order to investigate the optimum lag order out of them. The reason for not selecting higher lag order is because of the fact that the numbers of observations in the study are 78 and with such observations, it was better to have smaller lag order for better results.

The study utilized Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ) for the selection of optimum lag order for study. SC and HQ suggested lag order 1 to be the optimum lag order for study. As, two criterions suggested 1 lag order so the study selected 1 lag order to investigate the long run association between banking index and selected macroeconomic variables.

There are different statistical techniques which could be employed in order to investigate the long run association between selected macroeconomic series and banking index. Every statistical tool which could be used for such purpose has its own assumptions. In order to investigate the long run association between selected macroeconomic series and banking index, the study can employ Johansen's Co integration test. In order to apply this test on the selected macroeconomic series and banking index, all of the time series should be integrated at same level. The ADF test provided evidence that the selected time series are not integrated at same level. The PP test justified the results of ADF test by providing similar results that selected time series are not integrated at same level. This implies that Johansen's co integration test cannot be applied on all of the selected macroeconomic series and banking index. In order to apply Johansen's co integration test, the study will be required to test only those time series which are integrated at same level but this application is not possible because of the fact that banking index which is the dependent variable in study is integrated at I (0) and most of the time series of macroeconomic variables are integrated at I (1).

Another statistical technique which can be used in order to investigate long run association between selected macroeconomic series and banking index is ARDL approach. This approach is used for time series data which is integrated at different levels. The ADF test and PP test provided information that selected macroeconomic series and banking index are integrated at different levels. Thus, ARDL approach is suitable for application under these constraints. The ARDL approach to investigate long run association provides an edge over Johansen's co integration technique because ARDL can be applied even if the variables are found to be co integrated at different levels. One of the primary assumptions of ARDL approach to long run association requires that none of the time series under study is integrated at I (2). The test results of ADF and PP justifies that none of the time series is integrated at I (2) when intercept and constant both are included in study. The data meets the assumptions of ARDL approach due to which this approach has been employed to test long run association between selected macroeconomic series and banking index.

There are different significant advantages of using ARDL approach to investigate long run association between selected macroeconomic series and banking index in this study. The primary advantage is that ARDL approach is suitable for application on relatively small sample size. The results obtained by application of ARDL approach on relatively small sample size provides better results as compare to other statistical techniques used for testing long run association. This study covered 7 years of data for selected macroeconomic series and banking index ranging January 2008 to August 2014. Due to limited data availability for selected macroeconomic series and banking index, the selection of ARDL is once again suited to the constraints. Thus, the constraints in study directed towards usage of ARDL approach to investigate long run association between selected macroeconomic series and banking index.

The study utilized 1 lag order to formulate the ARDL model to investigate the long run co-movement between banking index and selected macroeconomic variables. The ARDL model formulated under 1 lag order is as follows:

$$\Delta(\text{LnIND}) \text{ LnIND (t-1) LnBOND(t-1) LnEXRUS(t-1) LnEXP (t-1) LnINF (t-1) LnIP (t-1) LnKIBOR(t-1) LnMONEY(t-1) LnOIL(t-1)} \\
 \Delta(\text{LnIND(t-1)}) \Delta(\text{LnBOND(t-1)}) \Delta(\text{LnEXRUS(t-1)}) \Delta(\text{LnEXP(t-1)}) \Delta(\text{LnINF(t-1)}) \Delta(\text{LnIP(t-1)}) \Delta(\text{LnKIBOR(t-1)}) \\
 \Delta(\text{LnMONEY(t-1)}) \Delta(\text{LnOIL(t-1)}) c @trend$$

According to ADF test applied, industrial production was stationary with the inclusion of both intercept and trend. Due to this reason, the ARDL model formulated in this study using 1 lag order included intercept and trend both in the equation. The OLS method was utilized in order to test the formulated ARDL model in this study. The results obtained by ARDL 1 lag order model are shown in following table:

Table 5 Auto-Regressive Distributed Lag Result
Auto-Regressive Distributed Lag Result

Variable	Coefficient	t-Statistics	Prob.
LnINDEX(t-1)	-1.001	-5.99	0.00
LnBOND(t-1)	0.008	0.43	0.66
LnEXCHANGE(t-1)	-0.039	-1.85	0.07
LnEXPORTS(t-1)	0.007	0.90	0.36
LnINFLATION(t-1)	-0.010	-1.96	0.05
LnIP (t-1)	0.002	0.28	0.77
LnKIBOR(t-1)	0.004	0.57	0.56
LnMONEY(t-1)	-0.008	-0.24	0.81
LnOIL(t-1)	-0.019	-3.07	0.00
Δ LnINDEX(t-1)	0.219	1.79	0.07
Δ LnBOND(t-1)	0.012	0.67	0.50
Δ LnEXCHANGE(t-1)	-0.004	-0.07	0.94
Δ LnEXPORTS(t-1)	0.004	0.42	0.67
Δ LnINFLATION(t-1)	0.012	1.85	0.06
Δ LnIP (t-1)	0.006	0.51	0.61
Δ LnKIBOR(t-1)	-0.003	-0.22	0.82
Δ LnMONEY(t-1)	0.000	-0.00	0.99
Δ LnOIL(t-1)	0.006	0.66	0.51
C	7.132	5.67	0.00
@TREND	0.000	0.78	0.43
R-squared	0.59	F-statistic	4.36
Durbin-Watson stat	2.13	Prob(F-statistic)	0.00

The probability values for exchange rate, inflation and oil prices are less than 10% significance level due to which the null hypothesis for exchange rate, inflation and oil prices have been rejected. The alternative hypothesis for exchange rate, inflation and oil prices has been accepted suggesting that there prevails long run relationship between banking sector index and macroeconomic variables exchange rate, inflation and oil prices. The probability values for macroeconomic variables interest rate on bonds, exports, industrial production, KIBOR and money supply are more than 10% significance level due to which the research fails to reject null hypothesis for these variables. The alternative hypothesis have been rejected for interest rate on bonds, exports, industrial production, KIBOR and money supply suggesting that there does not prevails long run relationship between these variables and banking sector index. The Probability value of F-Statistics suggests that the model is significant and can be opted for study.

The probability value suggests that model selected for ARDL is a good fit model. The Durbin Watson (DW) test is employed in order to identify the presence of autocorrelation in the selected model. The acceptable value of DW statistics test lies in range of 1.75 to 2.25. The results suggest that the value of DW statistics for selected ARDL model is 2.14, which is within range of acceptance. Thus, the assumption of autocorrelation has been satisfied. There is a presence of a slight negative autocorrelation in selected ARDL model which is within acceptable range. In order to investigate the long run association between selected macroeconomic variables and banking index, the study applied bound testing on the results obtained from ARDL model under 1 lag order. Bound testing was also used by, Ahmed and Ali (2008) in order to investigate long run co integration between stock market development and economic growth in pakistan. The results of bound testing applied on ARDL model is as follows:

Table 6 Wald-Coefficient Restrictions Test Result

Wald-Coefficient Restrictions Test Result

Wald-Coefficient Restrictions Test			
F-statistic	5.31	Probability (9, 56)	0.00
Chi-square	47.87	Probability (9)	0.00
Null Hypothesis: C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=C(9)=0			

Bounding test for ARDL model of co integration has been employed in order to investigate the long run association between selected macroeconomic variables and banking index.

The null hypothesis of bound testing states that there is no long run co integration between selected macroeconomic variables and banking index while alternative hypothesis of bound testing states that there is long run co integration between selected macroeconomic variables and banking index. Thus, the null hypothesis of no co integration has been tested against the alternative hypothesis of co integration. In order to interpret the F-Statistics value, the study will need upper bound and lower bound values for F-Statistics at 1%, 5% and 10% significance level. Thus, the upper bound and lower bound values for F-Statistics are shown as follows:

Table 7 Bound Testing for ARDL Model of Co integration

Bound Testing for ARDL Model of Co integration

F-statistic = 5.31		
Significance Level	Lower Bound Value	Upper Bound Value
10%	2.29	3.38
5%	2.60	3.74
1%	3.22	4.41

The above table contains that lower bound values and upper bound values for bound testing at 1%, 5% and 10% significance level. If the F-Statistics of bound testing is greater than lower bound value and upper bound value then null hypothesis of no co integration between selected macroeconomic variables and banking index can be rejected. The F-Statistics of bound testing for ARDL is greater than the limits of lower bound value and upper bound value due to which the null hypothesis is rejected. Hence, bound testing suggests that there is presence of long run co integration or association between selected macroeconomic variables and banking index. The probability value is also less than 1%, 5% and 10% suggesting rejection of null hypothesis in this study.

Presence of long run association between selected macroeconomic variables and banking index indicates that there might be presence of unidirectional or bidirectional causality as well. In order to investigate bidirectional causality between selected macroeconomic variables and banking index, the study employed Granger Causality test. The Granger causality test investigated the bidirectional and unidirectional causality between selected macroeconomic variables and banking index. The results of Granger causality test described the Granger causal relation between selected macroeconomic variables and banking index. After employing lag order selection criterion, the optimal lag order selected was 1 lag order. Thus, Granger causality test was applied at 1 lag order. Granger Causality test was applied at first difference level for the selected macroeconomic variables and banking index to make sure that all the variables are stationary. The results obtained from the Granger causality test are shown on following page:

Table 8 Pairwise Granger Causality Tests at Lag 1

Pairwise Granger Causality Tests at Lag 1

Null Hypothesis:	Obs	F-Statistic	Prob.
DINDEX does not Granger Cause DBOND	76	6.63	0.01**
DKIBOR does not Granger Cause DINDEX	76	6.41	0.01**
DOIL does not Granger Cause DINDEX	76	12.63	0.00***

*Variable is significant at .10(10%) significance level

**Variable is significant at .05(5%) significance level

***Variable is significant at .01(1%) significance level

The results of Granger Causality provide information for bivariate unidirectional and bidirectional causality between selected macroeconomic variables and banking index. From the results of Granger Causality, the research found that banking index does Granger causes government bonds yield rate in a unidirectional manner at 5% significance level. The KIBOR also Granger causes banking index in a unidirectional manner at 5% significance level. The Granger Causality between banking index and Oil prices is also unidirectional from oil prices to banking index which means oil prices Granger causes banking index at 1% significance level.

Thus, Granger causality test indicates unidirectional Granger causality from macroeconomic indicators KIBOR and oil prices to banking index. The Granger causality test also indicates unidirectional Granger causality from banking index to government bonds yield rate.

IV. CONCLUSION

The study employed ARDL technique for the examination of long term association between selected macroeconomic indicators and banking index in Pakistan as the selected macroeconomic indicators and banking index were integrated at different level suggested by ADF and PP test. The results of ARDL technique provided evidence that there exists long term association between macroeconomic indicators exchange rate, inflation, oil prices and banking index in Pakistan. Thus, the pattern of selected macroeconomic variables can be used for predicting the future performance of banking index in Pakistan.

The Granger causality technique tested the unidirectional and bidirectional Granger causality between selected macroeconomic variables and banking index in Pakistan. The Granger causality test provides evidence for the existence of unidirectional Granger causality from banking index to Government bond yield 10 year rate. The results of Granger causality also suggests that Oil prices and KIBOR Granger causes banking index in Pakistan.

The Granger causality also suggested that banking index in Pakistan is a leading indicator in case of Government bond yield 10 year rate while it is lagging indicator in case of oil prices and KIBOR. Thus, the leading and lagging behavior of banking index in Pakistan was also tested by using Granger causality technique.

V. RECOMMENDATION

The study found some interesting results at the end and formulated some recommendations on basis of this conclusion. The increase in oil prices in short run reduces the banking index in Pakistan which suggests that banking index at KSE performs better when the oil prices are reducing. Reduction in oil prices should be encouraged in order to boost the banking index performance in Pakistan.

The study found that there prevails long run co-movement between inflation, Exchange rate (With U.S), Oil Prices, Exports Volume, Pakistan Government Bond Yield 10 year rate, KIBOR, Industrial Production, Money Supply (M0) and banking index in Pakistan. The investors can use the trend of these economic indicators to forecast the trend of banking index in Pakistan as these selected macroeconomic indicators are associated with banking index significantly in long run.

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