Role of Macroeconomic Indicators in Banking Crisis

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ABSTRACT

This study examines the long run relationship between macroeconomics indicator and bank crisis for the country like Pakistan. The Johansen co-integration approach has been used to inspect the relationship between them. The yearly data has been used from the period 1991 to 2012. The results of co-integration have indicated the long-run association between the macroeconomics variables and bank crisis. The relationship between banking crisis and exchange rate is found to be negative and very significant. The growth rate has also shown highly significant and negative relationship with banking crisis. There is positive relationship between inflation rate and banking crisis. There is need to create sound and fearless environment for the foreign investors, so that they invest in different business, project and stocks. Due to their investment employment opportunities should be created in the country and unemployment will decrease.

Keywords: Bank Crisis, Unemployment, Inflation, Co-integration, VECM

INTRODUCTION

Macroeconomic indicators are the statistics which shows a clear picture of a respective country. The economic performance of any country can be checked with the help of these indicators. The main macroeconomic variables are Gross Domestic Product (GDP), Consumer Price Index (CPI), Employment rate, Interest rate and Balance of Payments (BOP). These economic indicators play a vital role in the economy of the country. The performance of every sector is influenced by these indicators, specially the banking sector. The various decisions in every sector of a country are taken in the working and light of these indicators.

Pakistan is experiencing financial liberalization, which has created two big crisis; banking and balance of payments crisis. Valencia et.al (2009) quoted that Crisis often follow expansions triggered by badly sequenced regulatory reforms and financial liberalization. But it is also found that there is a relationship between macroeconomic indicators and banking crisis. According to Abbas and Pasha (2009) Crisis in Pakistan are usually result of weak economic conditions, hence worsening condition of economic variables can serve as an early warning for the forthcoming banking or currency crisis. This means that performance of banking sector is largely effected by the macroeconomic variables. Detragiache, E (1998) also suggested that the weakness of macroeconomic environment gives rise to banking crisis. Low GDP growth can increased the risk to banking sector.

Whenever macroeconomic development take place in any country it gives health to banking sector. So we have not to focus only on economic growth but also on economic development. We should have to give importance to both of them. Because this is the only way to take economy of the country towards sustainability. This can happened only if each macroeconomic variable perform better. There is need to check the performance of macroeconomic indicators and also their effects on the banking sector.

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OBJECTIVES OF STUDY

The main objectives of this study are:

1. To check the performance of macroeconomic indicators.
2. To inspect the relationship between macroeconomic variables and banking crisis.
3. To investigate the role of macroeconomic indicators in the banking sector.

LITERATURE REVIEW

Many economic scholars have inspected the role of macroeconomic indicators in the financial crisis and also have given different measures to get rid of any type of crisis. But there is still need to examine the causes of financial crisis.

In risk management, credit risk is very much important. Especially in financial institutions it plays a very important role. Jakubik, P (2007) investigated the relationship between credit risk and macroeconomic indicators. For this purpose quarterly data was used from Q_1 1997 to Q_3 2005. The Latent-factor model was used to estimate the results. He found that there is a strong relationship between credit risk and macroeconomic indicators. As macroeconomic indicators can only create a better or worse environment for the working of financial institutions.

Currency crisis and banking crisis together leads to financial crisis due to which the whole economy in effected. The reasons of currency and banking crises were checked by Kaminsky, G and Reinhart, C (1999). The main focus of their study was on the causes of these two crises that how they arises. To achieve their objective they analyzed the banking crisis and balance of payments (BOP) crisis of different countries from the year 1970 to 1995. They concluded that due to poor policies of financial liberalization the banking crisis occurs which leads to currency crisis. The currency crisis causes the financial crisis. Due to which the growth in the economy becomes low. Finally this problem leads to BOP crisis. These all crisis are inter-related with each other but the problem first arises from the banking sector.

Abbas, H and Pasha, F (2009) studied the different effects of financial liberalization on banking sector and balance of payments in Pakistan. They used monthly data for their analysis from February 1964 to June 2008. They found that Pakistan is experiencing financial liberalization and exchange rate changes, which have created two well known crisis; banking and balance of payments crisis. The reason of these two crises is due to severe economic conditions prevailing in the country and weak performance of macroeconomic variables.

The various countries in the world are facing the systemic banking crisis. The factors which are related with systemic banking crisis were found by Detragiache, E and Kunt, A (1998). He used a large sample of developed and developing countries from the year 1980 to 1994 by applying multivariate logit econometric model. The results suggest that the weakness of macroeconomic environment gives rise to banking crisis. Low GDP growth can increased the risk to banking sector. This shows that macroeconomic indicators plays vital role in financial crisis.

Marlor, A (1997) also suggested that the various macroeconomic indicators can cause the systemic risk to increase. He analyzed the data for the time period 1980 to 1996. He concluded that the macroeconomic indicators plays a vital role in the banking sector and also affects the working of banks. Whenever macroeconomic development takes place, the health of the banking sector is improved. There is needed to make banking sector's business decisions according to macroeconomic developments. So, that the performance of banking sector becomes better than before.

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Using the yearly data from 1990 to 2000, Lindhe, L (2000) estimated the relationship between several macroeconomic indicators and business failures. During his study he found that the main macroeconomic indicator GDP and business failures have negative relationship. It means that when GDP increases the risk of business failures reduces. Whenever the economy is at its boom, there are limited chances of business failures.

The banking sector crisis in 38 countries was examined by Hardy, D and Pazarbasioglu, C (1998). The main objective of his study was to inspect the role of macroeconomic indicators and banking sector in the difficulties faced by financial institutions. He used the monthly data of different developing countries from the year 1980 to 1997. Using maximum likelihood ratios his findings suggested that banking crisis is strongly associated with low GDP growth, high inflation, rise in real interest rate and decrease in exchange rate.

The monetary policy working rules for a developing country like Pakistan were examined by Aleem, A and Lahiani, A (2011). Using quarterly data from year 1992 Q_1 to 2008 Q_1 they employed Generalized Method of Moments (GMM) to estimate the results. In Pakistan, State Bank is the central bank that controls the monetary policy of the country. He suggested that monetary policy rules of developing countries should be different from developed countries. His results suggest that there is a large influence of US monetary policy on the State Bank of Pakistan. Changes in the monetary policy should be made according to inflation rate in the country.

Mishkin, F (1996) had also explained different causes of financial crisis. The main focus of his study was on the banking and financial crisis in the developing countries. He suggested that an institutional structure is very important for developing countries. Due to this the developing countries would be secured from banking and financial crisis and if these two crises occur, their effects would not be undesirable.

Study conducted by Azam et al. (2011) highlights that there is a long run causal relationship between macroeconomic indicators and financial crisis. During their study they found that financial crisis indicators: inflation rate, interest rate and the volume of foreign debt have a large impact on economic growth in Pakistan. To inspect this impact and relationship they used Johansen's co-integration test. Data time period was from 1972 to 2010. They recommended that State bank of Pakistan should have to maintain the interest rate and keep it at reasonable level. So that money supply can be controlled across the country and there would be no chance of financial crisis.

Budsayaplakorn et al. (2007) in their study investigated that macroeconomic indicators can forecast a currency crisis or financial crisis. For this purpose they used the quarterly data of 16 macroeconomic indicators of different Southeast Asian countries. The data time period was from 1975:1 to 1997:4. Their methodology was based on signal approach and a multivariate probit model. They found GDP, stock market indices and international reserves more responsive and useful in predicting currency crisis. Their results indicated that government policies, macroeconomic environment and the expectations of investors are the main reasons of currency crisis. So it is very important to make government policies and macroeconomic environment better across the country.

The causes of Asian financial crisis were inspected by Zhuang, J and Dowling, M (2002). Using early warning system (EWS) model, they found that the countries that were facing faults in economic and financial systems across their countries had played vital role in the overall financial crisis. The main reasons and warning indicators of financial crisis they found are real appreciation of currencies, excessive growth of domestic credit, and too much external borrowing by banks, high inflation rate and slow pace of economic growth.

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Another study conducted by Borio, C and Lowe, P (2002) investigated that how banking crisis can be predicted by macroeconomic indicators. For this purpose they constructed simple composite indicators which can be helpful is assessing banking crisis. Their sample includes 34 countries and the data are yearly covering period from 1960 to 1999. They found that the behavior of credit, prices of asset and exchange rate can be useful in predicting financial imbalances. This means that any vulnerability in these indicators can create alarming situation for the financial system.

Jermann, U and Quadrini, V (2012) have investigated different effects of financial shocks by using two alternate approaches: Solow residual methodology and Bayesian methods. The yearly data was used from 1952 to 2010. They found that financial shocks have contributed extensively towards real and financial variables. Their findings also showed that tightening of firms and financing conditions has a significant effect on the pace of GDP.

All the literature discussed showed above had showed that there is a strong association between macroeconomic indicators and financial crisis. Any vulnerability in these indicators can give fire to financial crisis. In case of Pakistan performance of core macroeconomic indicators is not satisfactory. So there is need to examine that how these indicators are affecting the financial system of Pakistan.

DATA COLLECTION AND METHODOLOGY

Data Collection

In this study the long term relationship between the dependent and independent variables have been explored. The data used for estimation has collected on yearly basis for the period from 1991 to 2012. The data have been collected from the reliable sources. The data sources of variables are International Financial Statistics (IFS), State Bank of Pakistan (SBP) and World Development Indicator (WDI).

Methodology

There are numerous methods and techniques to inspect the long run association between macroeconomic variables and banking crisis. In this study we have used Co-integration test presented by Johansen Juselius (1990) to find out the long-run association between the variables.

Johansen Co-integration Test

J-J approach of co-integration test is based on maximum likelihood approach and was introduced in 1988. If there are more than two variables in the model then there is possibility of more than one co-integrating vector in the model.

$$Y_t = B_1 Y_{t-1} + B_2 Y_{t-2} + \ldots\ldots\ldots + B_k Y_{t-k} + u_t \text{ ---------- (1)}$$

This can be reformulated into Vector Error Correction Model (VECM) as follows:

$$\Delta Y_t = \Omega_1 \Delta Y_{t-1} + \Omega_2 \Delta Y_{t-2} + \ldots\ldots + \Omega_{k-1} \Delta Y_{t-k-1} + \pi Y_{t-1} + u_t \text{ ---------- (2)}$$

Where $\boldsymbol{\Omega}_i = (I - B_1 - B_2 - \ldots\ldots - B_k)$ (i= 1, 2 . . . k-1) and $\boldsymbol{\pi} = -(I - B_1 - B_2 - \ldots\ldots - B_k)$

The above matrix is $\boldsymbol{\pi}$ is 3×3 because we assume that there are three variables in the model. $\boldsymbol{\pi} = \alpha\beta'$ where α is the speed of adjustment to the equilibrium coefficients and β' is the long-run matrix of coefficients.

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Model Specification

This study investigates the long-run association between the macroeconomic variables: Growth rate (GDP), inflation rate, unemployment rate, exchange rate and and Banking crisis. Using co-integration approach the model can be written in a following way:

$$LogY_t = \beta 1 LogER_{t-1} + \beta 2 LogGR_{t-1} + \beta 3 LogIR_{t-1} + \beta 4 UR_{t-1} + € \quad \text{---------- (3)}$$

The natural log is taken to make the variables continuous and linear. t-1 is showing the lag and **β1, β2, β3** and **β4** are the parameters. Where **€** is the error term in the model

RESULTS AND INTERPRETATION

Descriptive Analysis

Descriptive statistics are given in the table 1. The table includes the values of mean, median, mode, skewness and kurtosis etc. the mean value shows that there is 0.089% positive change or increased the banking crisis, 54.537% in exchange rate, 4.610% in growth rate, 9.239% in inflation rate and 6.323% in unemployment over the year respectively. The standard deviation is showing deviation of variables from the equilibrium. The variable growth rate is showing more disequilibrium as compared to other variables. The Skewness statistics is showing that all the variables (banking crisis, exchange rate, growth rate, inflation rate and unemployment rate) are positively skewed. Kurtosis is showing normality in the behavior of only one variable: inflation rate

Table 1. Descriptive Statistics

	Banking Crisis	*Exchange Rate*	*Growth Rate*	*Inflation Rate*	*Unemployment Rate*
Mean	0.089068	54.53746	4.610091	9.23953	6.323909
Median	0.078861	58.00493	4.1925	9.597047	6.195
Max	0.139696	93.3952	9	20.28612	8.267
Min	0.051107	23.80077	1.7	2.914135	4.689
Std. Dev	0.027246	20.58708	2.033094	4.263626	1.070945
Skewness	0.340951	0.203219	0.414813	0.41763	0.427219
Kurtosis	1.735275	2.137872	2.356952	3.2622	2.158263

Source: IFS, SBP & WDI

Unit-Root Test

To find the long run relationship between banking crisis and macroeconomic variables we are going to use co-integration technique. Co-integration analysis will tell us there is long-run association among the variables or not. The first step of co-integration is to check the stationarity of the variables and the condition to use Johansen co-integration is that the entire variable must be stationary at first difference. For this purpose Augmented Dicky-Fuller (ADF) test has been used at level and first difference. Results of unit root test have been shown in the table 2.

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Table 2. Unit-root Test

Variables	*ADF Test*		*Stationarity*
	Level	*I[st] Diff*	
Bankig Crisis	-1.75599	-4.4276*	I(1)
Exchange Rate	0.557694	-3.04721*	I(1)
Growth Rate	-2.31346	-6.78993*	I(1)
Inflation Rate	-2.15714	-5.66208*	I(1)
Unemployment Rate	-1.2466	-4.18798*	I(1)
Critical Values			
At 1% level	-3.78803	-3.80855	
At 5% level	-301236	-3.02069	
At 10% level	-2.64612	-2.65041	

I*significant at 5% level 3; Source: IFS, SBP & WDI

First we have applied unit-root test on each variable to check its stationarity. The stationarity have been taken at 5% level. The t-statistics value of the dependent variable (banking crisis) is 1.75599 which is less than the critical value -301236. So we the dependent variable is non-stationary at level. Now at first difference the t-statistics value of banking crisis is -4.4276 that is greater than the critical value -302069. So the variable is stationary at first difference level. By following the same method stationarity of other variables have been checked. It is clearly seen from the results of unit-root test that all the variables are non-stationary at level but stationary at first difference. So we can say that the variables are integrated of order one I (1). The condition of using Johansen co-integration has been successfully fulfilled. Now we can proceed forward.

Johansen Co-Integration Test Results

After getting the confirmation that all the variables are stationary at first difference. We have applied co-integration test. In co-integration we have used Maximum Likelihood ratio test which includes trace statistics and maximum Eigen value statistics. The Table 3 shows the results of trace statistics at a lag length of one year. Null hypothesis indicates that at none there is no co-integration between banking crisis and the macroeconomic variables for the period of 1991 to 2012.

At null hypothesis trace statistics value is 92.24453 which is greater than critical value 69.81889 so we can reject this null hypothesis that there is no co-integration among the variables. Alternate of this null hypothesis is that there is at least one co-integration vector in the variables. We can also reject this hypothesis because the trace statistics value 53.28722 is greater than the critical value 47.85613. The alternate hypothesis of this is that there are at least two co-integrating vectors in the variables. We cannot reject this hypothesis because the trace statistics value 24.76034 is less than the critical value 29.79707. So there are at least two co-integrated equations or two co-integrating vectors among the variables at 5%

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significance level. So, we can say that there exists co-integration among the variables. For the purpose of confirmation we have also checked the Max-Eigen value in the Table 3. This has also confirmed the existence of two co-integrating vectors among the variables.

Table 3. Co-integration Test

Hypothesized No. of CE(s)	*Eigen Value*	*Trace Statistic*	*0.05 Critical Value*	*Prob. ***
None *	0.857422	92.24453	69.81889	0.0003
At most 1 *	0.759815	53.28722	47.85613	0.0142
At most 2	0.520817	24.76034	29.79707	0.1702
At most 3	0.389913	10.04688	15.49471	0.2771
At most 4	0.008157	0.163817	3.841466	0.6857

Trace test

indicates 2 co-integrating equation(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**Mackinnon-Haug-Michelis (1999) p-values

Table 4. Co-integration Test

Hypothesized No. of CE(s)	*Eigen Value*	*Max-Eigen Statistic*	*0.05 Critical Value*	*Prob. ***
None *	0.857422	38.95731	33.87687	0.0114
At most 1 *	0.759815	28.52688	27.58434	0.0378
At most 2	0.520817	14.71347	21.13162	0.3095
At most 3	0.389913	9.883062	14.2646	0.2197
At most 4	0.008157	0.163817	3.841466	0.6857

Max-eigen value test indicates 2 co-integrating equation(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

We have seen that in table 4 the Max-Eigen value 14.71347 which is smaller than the critical value 21.13162. So here it is also confirmed that there are two co-integrating vectors among the variables and there is co-integration between the variables.

Vector Error Correction Model (VECM)

As the co-integration results test has shown the existence two co-integrated equations. So we can declare that there exists is a long-run association between the banking crisis and macroeconomic variables. Now Vector Error Correction Model (VECM) is applied to check that how effectively macroeconomic variables are playing their role in banking crisis. The results of VECM have shown in appendix 2. The dis-equilibrium value is -0.169148. This shows that the variables are 16.91% deviated from their equilibrium position. After six years they can come to their equilibrium position.

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CONCLUSION

In our study we have found that there is long-run association between banking crisis and macroeconomic variables. These indicators are playing big role in banking crisis in Pakistan. The relationship between banking crisis and exchange rate is found to be negative and very significant. This shows that any fluctuation in exchange rate can invite banking crisis. In Pakistan the exchange rate is not stable and there comes many ups and downs in it. So we can say that in Pakistan, behind banking crisis there is a major role of exchange rate. Another macroeconomic variable known as growth rate has also shown highly significant and negative relationship with banking crisis. As any type of crisis in any sector of country have negative effects on growth rate of that country. It can effect the economic performance of that country. So in Pakistan poor growth rate has also invited banking crisis and on the other hand banking crisis has badly affected the economic performance. We can say that there is one to one relationship between these both variables.

Inflation rate is also a major macroeconomic variable and we have also used it in our study. We have found a positive relationship between inflation rate and banking crisis. As in Pakistan inflation rate is at its top level and is increasing day by day. Hence it is inviting banking crisis. There are several other reasons which are affecting the banking sector in Pakistan. The law and order situation is very poor. It has made investment very risky in Pakistan. There is need to improve the law and order situation and the performance of macroeconomic variables. Inflation rate should must be maintained at a specific level and do not let it rise. Banking policies should be made according to the prevailing situation of macroeconomic variables. If the current situation continuous, then we can have financial crisis in future

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