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Macroeconomic Factors, Banking Variables and Banking Crisis in Developing Countries

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Abstract: *Occurrence of industrial revolution in the late of eighteenth century and early of nineteenth century is beginning of capitalist economic system. Since that time on, this system passed numerous financial, economic and banking crises. Theoretically, there are many reasons to confirm that financial, economic and banking crises are natural phenomena in capitalist economic system. On the other hands, occurrence of many serious crises during these two current centuries can confirm the hypothesis in above in terms of evidences and statistical evaluations. However, it can be concluded that financial, economic and banking crises are basically concerning and they need to investigate and analyze suitable policies to prevent and manage crises.*

The main objective of this study is to determine effective factors on banking crises during the period of 2001 to 2017 for 35 developing countries with normal income. Therefore, data are panel data type and the estimation method is in the field of Logit method.

The results show that economic growth variable has negative and significant effect on the possibility of being bank in the crisis for one year or more than two years. Inflation variable has also positive and significant effect on crisis occurrence for one year or more than two years. Depreciation variable does not have significant effect on financial crisis occurrence. Open degree variable has positive and significant effect on crisis occurrence. Also, the results show that liquidity variable has negative and significant effect on crisis occurrence for one year; however, it does not have significant effect for more than one year. Leverage ratio variable has negative and significant effect on crisis occurrence for one year or more. The ratio of credit to economic growth has positive and significant effect on crisis occurrence in one year time only. The ratio money saving variable (the ratio of money capacity to saves) has negative and significant effect on crisis occurrence for one year time. However, it has positive and significant effect for more than one year time.

Finally, the fact that financial crisis patterns are useful tools for policymaking, but should not replace financial legislators' judgment. It is clear that even at the international levels, financial crisis patterns are only used as a troubleshooting tool for economy. As a result, updating such patterns for monitoring macroeconomic performance and troubleshooting policies in community macroeconomic management can be useful. These models can be used for the causes of financial crisis formation in the country.

Key words: *Banking Crisis, Macro economic Variables, multiple Longit model, Developing Countries*

JEL: *G01, G21, E58, F45, J11.*

INTRODUCTION

After the Global Financial Crisis (GFC), the most recent occurrence of a widespread banking crisis, a great deal of attention has focused on measuring states of the economy and identifying their turning points. The use of a prompt and accurate crisis detection tool couldprovide authorities with valuable additional time to design and implement preventive orresolution measures. The literature on banking crisis detection is divided into two streams consisting of 'event based' and 'empirical based' analyses. Most of the 'event based'literature focuses on the observation of events to determine a banking crisis ex-post.

There are short comings in crisis identification arising from the subjective judgement inherent in the event based method. For example, there are various judgement-based identifications ofthe initial onset of the recent GFC. Using a broad set of chronology, some studies such asTaylor and Williams (2008), Calomiris (2008) and Flannery, Kwan, and Nimalendran (2013)date the commencement of the GFC, variously between August 2007 and February 2008,

Reflecting the closure of BNP Paribus (France) and the failure of Northern Rock bank (United Kingdom), respectively. While others date the GFC to September 2008, using dates such asthe liquidation of Lehman Brothers and/or the de-facto nationalisation of Fannie Mae and Freddie Mac in the U.S. (Elliott, 2011; Kazi & Salloy, 2013).

The topic is highly relevant in terms of policy. Crises typically cause huge output losses and social costs. Hoggarth *et al.* (2002) estimated that the average crisis causes a production loss of 20% of annual GDP. A recent stimulus to this area of research is the countercyclical capital buffer (CCB) proposal by the Basle Committee (2010). Regulators will impose additional capital requirements on all banks if alarming signs are observed in the macro financial environment, but this is impossible unless they know what kinds of signs are alarming. Drehmann et al. (2011) explicitly motivate their analysis by the need to identify good triggers for countercyclical capital buffers. The CCB was recently implemented in the EU's capital requirements directive (2013/36/EU) and similar regulatory reforms are coming on stream in the rest of the world as well.

Bernanke and James (1991) provide one of the few econometric studies focusing on the inter-warperiod; they analyses a monthly panel data set of industrial production for the period from 1930 to 1936and find an important role for banking crises in explaining the link between falling prices and fallingoutput. They find that banking crisis has a significant and large negative impact effect on industrialproduction growth rates, implying that severe

banking panics reduce output growth in dependently of gold-standard effects. A number of other studies use descriptive analysis to document the effect ofmajor financial crises. Reinhart and Rogoff (2009) argue that major financial crises raise unemploymentand reduce growth in the decade following a major banking crisis. Reinhart and Reinhart (2010) plot the probability density functions of several key macroeconomic indicators for the ten years beforeand after major financial crises, and use the non-parametric Kolmogorov Smirnov test to examinewhether these indicators are drawn from the same distribution. They find that real GDP per capitagrowth rates are significantly lower in the decade following severe financial crises, such as the 1930s.Reinhart and Rogoff (2014) examine the effect of 100 systemic banking crises since the mid-19thCentury (approximately one third of their events take place within the inter-war period) and findthat such events have long lasting effects; it takes a mean of eight years to reach pre-crises levels of percapita income. Grossman (1994, 2010) describes the cyclical time-profiles of GDP during the GreatDepression of the 1930s in countries experiencing banking crises and non-crisis countries and findsevidence of high amplitude depressions and persistent differences in the recovery profiles of bankingcrises countries, compared to non-crisis countries.

Most of the existing empirical research on the predictability and contagion of financial crises evaluates the probability of a banking system going into crisis using the traditional Probit/Logit models. Frankel and Rose (1996) is one of the first studies in this area using a Probit model to study the determinants of currency crashes in developing countries, and decisively contributes to the development of the early warning system literature. The works by Berg and Pattillo (1999), Edison (2003) and Berg et al. (2005) use the new indicators suggested by Kaminsky and Reinhart (1999) and a more general Probit model applied to the Asian crisis in the eighties. Demirgüç-Kunt and Detragiache (2002) use a multivariate Logit model for the prediction of banking crises. More recently, Bussière and Fratzscher (2006) show that binomial discrete-dependent-variable models are subject to what the authors refer to as ''post-crisis bias''. However, the correction of this bias is done in the context of a multinomial Logit model. Finally, Schularick and Taylor (2011) and Jordá *et al.* (2011) use a Logit model to study rare events associated with episodes of financial crisis, and Duca and Peltonen (2013) use a multivariate discrete choice model for assessing and predicting systemic financial events.

It is widely believed that banking crises are followed by recessions. Bank failures reduce credit supply, which may in turn limit both fixed investment and consumption and thereby lead to a recession (Serwa, 2010). However, in the theoretical model of Rancière, Tornell, and Westerman (2008), long-run growth and banking crises can be positively related. This

result builds on the literature showing a positive relationship between financial development and economic growth. In the model of Rancière et al., credit growth finances economic growth but is subject to downside risk. Banking crises are the realization of that downside risk. If the impact of financial development on long-run growth exceeds the short-run negative impact of banking crises, there will be a positive relationship between growth and banking crises.

Although this literature contributed to a deeper understanding of banking and financial crisis, the traditional Probit/Logitmodels do not allow one to consider the effect of the connections between the different banking/financial systems in the outbreak of a financial crisis.[1] As such, the validity of the estimators lays on the assumption that the observations/countries are different, but not connected. This means that these traditional models do not take into account that the occurrence of asystemic crisis in one country may also be a function of the neighboring banking system's health or even of the similarity of the banking structure and legal and institutional environment of another country with which it has strong financial ties, independently of the physical or trade proximity between the countries. It may also be a function of the banking regulation culture in each country.[2]

The paper is structured as follows. The Multinomial Logit Model is presented in Section 2. In Section 3 we discuss the descriptive statistics of variables and variables used in the empirical application. Results are discussed in Section 4, 5 and 6, while Section 7 results and Suggestions the paper.

2. DATA ANALYSIS

The population of the study is the developing countries (with average income) between the years 2001 to 2017. Names of the countries: Lithuania, Argentina, Chile, Latvia, Romania, Croatia, Uruguay, Croatia, Libya, Panama, Mexico, Malaysia, Bulgaria, Serbia, Belarus, Costa Rica, Albania, Kazakhstan, Azerbaijan, Ukraine, Bosnia and Herzegovina, Poland, Iran, Macedonia, Georgia, Venezuela, Armenia, Ecuador, Colombia, Jamaica, Tunisia, Jordan, Turkey, Algeria, Egypt, Greece (World Bank).

These countries were selected based on a two-step procedure. In the first step, average-income countries specified by the World Bank were selected from all the countries in the world. The World Bank classification with the purpose of drawing comparisons between countries is usually based on geographic regions or income level the first of which is not a suitable type for this study since these countries typically have oil revenues. The current study compares countries with the identical incomes.In the second step, 35 average-

income countries were randomly selected based on the available statistical data. The Multiple logit model was used in the current study.

2.1 Multinomial models

There are m consequences in Multinomial models and the dependent variable y takes the value j if it is the j-th consequence. The probability of choosing the J-thconsequence is as follows:

$$p_j = Pr[y = j]\ j = 1,2\ldots,\ m \tag{1}$$

Multinomial density for one observation as follows:

$$f(y) = p_1^{y_1} \times p_2^{y_2} \times \ldots \times p_m^{y_m} = \Pi_{j=1}^{m} p_j^{y_j} \tag{2}$$

The simplest type of multinomial model ismultinomial regression model. In statistics, logit regression multinomialis a classification method which in some cases has more than two discrete consequences. This method is used to predict the probabilities of different consequences. When the dependent variable is nominal and there are more than two categories,multinomial logit regression is used. Data is assumed to be of Ordinaltype in Logit models in which each independent variable has a value for each class. It is also assumed that the dependent variable is not entirely predictable by the independent variable of each class. As previously mentioned, in multinomiallogit model the dependent variable has more than two consequences, for example, if the dependent variable is employment status (full-time, part-time, none of the two).If the independent variable x ijis i-th view and j-th consequence the probability of multinomial logit model is as follows:

$$p_{ij} = \frac{e^{x_i^{'}\beta_j}}{\Sigma_{l=1}^{m} e^{x_i^{'}\beta_j}} \tag{3}$$

To estimate the coefficients of model (3), the maximum likelihood method is used. Maximum-likelihood function is as follows:

$$l = \ln L_N = \Sigma_{i=1}^{N}\Sigma_{j=1}^{m}\ y_{ij} \ln p_{ij} \tag{4}$$

Where $p\ ij = F\ (x,\ \beta)$ is a function of β coefficients and x independent variables.

Generalized pattern is as follows:

$$l = \ln L_N = \Sigma_{i=1}^{N}\Sigma_{j=1}^{m} Y_{ij} \ln\left(\frac{e^{\alpha+\beta_1 gdp+\beta_2 \inf+\beta_3 le+\beta_4 op+\beta_5 li+\beta_6 dep+\beta_7 cr+\beta_8 m2}}{\Sigma_{l=1}^{m}\ e^{e^{\alpha+\beta_1 gdp+\beta_2 \inf+\beta_3 le+\beta_4 op+\beta_5 li+\beta_6 dep+\beta_7 cr+\beta_8 m2}}}\right) \tag{5}$$

Multinomial logit regression approach is used to evaluate the probability of a banking crisis.Coefficients estimate and measure the effect of changing the independent variables on the probability of a banking crisis. The independent variables of the research are: Economic growth (GDP), inflation (INF), depreciation (DEP), M2/Reserves (M2), the ratio of credit to the economy (CR), leverage (LE), liquidity (LI) and net Openness (OP).

Banking crisis is the dependent variable of the study.Usingmultinomial logitregressionthe estimated coefficients are more precise.

The data collection and calculation of variables are summarized in the following table:

Table 1
Summary of data collection and calculation variables

Variable	*Symbol*	*Data definition*	*Source*
Banking crisis	BC	Banking crisis trap which takes 1 for the first year of the crisis and 2 for a number of years after the crisis, and zero for the rest of the year	International Monetary Fund
Economic Growth	GDP	Economic growth variable is obtained from growth Gross Domestic Product	World Bank
Inflation	INF	Inflation variable is obtained from price changes	World Bank
Depreciation	DEP	Rate of change of the nominal exchange rate vs. the US dollar. An increase indicates a depreciation of the domestic currency	World Bank
M2/Reserves	M2	Ratio of M2 to foreign exchange reserves of the Central Bank	World Bank
Credit-to-GDP growth	CR	Rate of growth of the ratio of real domestic private credit to GDP	World Bank
Leverage	LE	Ratio of baking system capital to assets	International Monetary Fund
liquidity	LI	Ratio of banking system private credit to deposits	International Money Fund
net Openness	OP	The ratio of net foreign assets to GDP. This indicator measures the degree of openness of the capital account. In fact, the index indicator of the country's capital exchanges with other countries.	International Money Fund

3. DESCRIPTIVE STATISTICS OF VARIABLES

Descriptive statistics includes the procedures used for the collection, summarization, classification and description of numerical facts. In fact, the statisticsdescribe the data and information of the study and provide the overall pattern of data for faster and better use.In short, descriptive statistics could be greattool for describing the characteristics of a data set.Central and dispersion metrics are used for this purpose.The main function of these criteria is that they can express the characteristics of a set of data as a number.This not only helps usunderstand the test results better, but also facilitates the way to compare the test results with tests and other observations. The independent variables of this research are economic growth (GDP), inflation (INF), depreciation (DEP), supply M2 (M2), the ratio of credit to the economy (CR), leverage (LE), liquidity (LI) and pure open and (OP). The following table presents the descriptive statistics of independent variables:

Table 2
descriptiveindicesof arranged data, central tendency, measures of dispersion

Variable	*OP*	*LI*	*LE*	*CR*	*M2*	*DEP*	*INF*	*GDP*
Mean	9.31×10^{12}	5.41×10^{8}	11.53	9.34	6.2×10^{10}	857.59	7.33	4.43
Median	7.85×10^{10}	0.00	10.78	6.01	2.18×10^{10}	5.34	4.9	4.68
Max	6.83×10^{14}	2.43×10^{10}	30.7	346.27	4.99×10^{11}	25000	95	10.4
Min	-1.32×10^{13}	0.00	4.7	-289.06	198627.9	0.48	-9.79	-6.2
Std. Dev	6.03×10^{13}	2.37×10^{9}	4.17	41.35	8.98×10^{10}	3414.88	9.32	7.48
Skewness	9.01	5.96	1.28	1.28	2.31	5.68	4.23	3.7
Kurtosis	88.33	43.44	5.2	5.2	8.51	37.5	29.42	87.1

The main central tendency indicator is the meanand indicates the balance point and distribution which is a good indicator of the mean value.For instance, for a variable like economic growth, the mean value is 4.34which indicates that more data are centralized on this point. Mode is one of the other indicators of central tendency which represents the community status. As can be seen the mode value of economic growth variable is 4.68which indicates that half of the data is less than 4.68 the other half is more.

Generally, distribution metrics are the criteria for determining the distribution of distributions compared to each other and compared to the mean. One of the most important distribution metrics is standard deviation. The value of this metricis 7.4 for economic growth variable. The asymmetric status of the frequency curve is called skewness. If the skewnesscoefficient is zero, the population is completely symmetric and if the coefficient is positive, it is a skewed right and if the coefficient is negative it isa skewed

left. Theskewness coefficientis positive and equal to 3.7 for economic growth variable and is a skewed right. If the Kurtosis is almost 3, the frequency curve of is normal. If the value is positive, the curve is bells shaped, it is wide if the value is negative. According to the definitions, all the variables used in this study have a positive Kurtosis. For example, the Kurtosis value forthe economic growth variable is 87 which means that the economic growth is not normally distributed. Also the dependent variable is the banking crisis (CR). Descriptive statistics of banking crisis for thirty five countries between the years 2001 until 2017are presented in the table below.

Table 3
Describes the Indicators of Arranged Data, Central Tendency, Dispersion Indices of Independent Variables

Variable	*Mean*	*Median*	*Max*	*Min*	*Std. Dev*	*Skewness*	*Kurtosis*
Banking crisis	0.34	0.00	2.00	0.00	0.71	1.70	4.14

To verify the normal distribution of data, the skewness and kurtosis criterion are used.Theskewness and kurtosis are zero and 3 respectively in normal distribution. The results of the above table show that the skewness and kurtosis of the banking crisis variableare1.71and4.1respectively which is more than the normal distribution kurtosis, so this variable is not normally distributed.

4. MULTINOMIAL LOGIT APPROACH

In calculating the probability of banking crisis, models should be used that coulddetermine theeffects of the variableon the crisis probability.

Table 4
The estimated coefficients for the first year of the crisis

Variable	*Coefficient*	*STD. ERR*	*testZ*	*Prob*
GDP	-0.0472093	0.022481	-2.1	0.019
INF	0.0794815	0.024531	3.24	0.001
LE	-0.1313486	0.115218	-1.14	0.253
OP	-0.0430165	0.012918	-3.33	0
LI	-0.1800178	0.052946	-3.4	0
DEP	-0.6030121	6.700134	-0.09	0.93
CR	-0.2018813	1.442009	-0.14	0.887
M2	-0.1252327	0.050908	-2.46	0.01
C	0.9449885	7.269142	0.13	0.894

Dependent variable is the crisis dummy. Standard errors, Z test and probability are reported.

Polynomial logitmodel is used to investigate the cases in which the dependent variable has more than two consequences. The advantages of this model can be the easeof estimationcomparing to models like Probit model and determination of the dependent variable probability.

According to the results of the above table, economic growth (GDP) has a significant negative effect on the probability of the bank to enter economic crisis in the first year.In other words, economic growth increase can decrease the probabilityfor the bank to enter economic crisis in the first year.

Inflation variable positivelyaffects the probability of crisis in the banking system which means that inflation increase can increase the probability for the bank to enter economic crisis in the first year. Leverage ratio was negatively associated with the banking crisis probability;which means thatan increase in Leverage ratio can decrease the probability for the bank to enter economic crisis.There is an opposite relation between Bank Openness and the crisis probability in the banking system based on which an increase in openness can decrease the probability for the bank to enter economic crisis in countries under study.Increasing the liquidity of the banking system is negatively correlated withbanking crisis. Also credit ratio increase of GDP and saving money negatively affectthe probability of a banking crisis.

One of the advantages of the multinomial logit model compared to the linear model is that the multinomial logit model can determine the probability of each consequence individually.

Since the dependent variable has three modes, no crisis, crisis for one year and crisis for more than a year, the probability for the bank to be in crisis for one year and more than a year should be estimated separately.

The above tablepresentsthe probability for the bank to be in crisis for one year. The following table presents the effect of each of the independent variables on the probability of the bank to be in crisis for more than a year and the continuity of crisis in the banking system.

According to the results of the above table, economic growth (GDP) has a significant negative effect on the probability of the bank to continue beingin economic crisis. In other words, economic growth increase can decrease the probability for the bank to be in economic crisis for more than a year.

Inflation variable positively affects the probability of crisis in the banking system which means that inflation increase can increase the probability for the bank to bein economic crisis for more than a year. Leverage ratio was

Table 5
The estimated coefficients for the banking system to be in crisis for more than a year

Variable	*Coefficient*	*STD. ERR*	*testZ*	*Prob*
GDP	-0.0307631	0.015229	-2.02	0.02
INF	0.0589534	0.019917	2.96	0.003
LE	-0.0221641	0.059903	-0.37	0.709
OP	0.0700138	0.036277	1.93	0.048
LI	0.0620261	0.080553	0.77	0.44
DEP	0.7300859	0.273441	2.67	0.002
CR	0.0306134	0.306134	0.1	0.92
M2	0.0746811	0.035062	2.13	0.03
C	-0.5895037	4.534644	-0.13	0.897

Dependent variable is the crisis dummy. Standard errors, Z test and probability are reported.

negatively associated with the banking crisis probability; which means that an increase in Leverage ratio can decrease the probability for the bank to be in economic crisis. There is a direct relation between Bank Openness and the crisis probability in the banking system based on which an increase in openness can increase the probability for the bank to be in economic crisis in countries under study. Increasing the liquidity of the banking system is negatively correlated with banking crisis. A decrease in exchange rate has a positive effect on the probability of a banking crisis since it causes instability in the banking system.Also credit ratio increase of GDP and saving money positively affect the probability of a banking crisis to continue for the second year.One of the disadvantages of nonlinear models is that coefficients are not directly interpretable. For example, the estimated coefficients in the above tables indicate the effect of the variables on crisis probability and not the crisis itself. In order to solve this problem,the marginal effects of each of the consequences should be determined. Once marginal effects are estimated, the effect of independent variables can be determined. The marginal effects of the independent variables can be observed for one year in the following table.

According to the results of the above table, economic growth (GDP) has a significant negative effect on the probability of the bank to continue being in economic crisis. In other words, economic growth increase can decrease the probability for the bank to be in economic crisis by 0.004. Inflation variable positively affects the probability of crisis in the banking system. Leverage ratio was negatively associated with the banking crisis probability; which means that an increase in Leverage ratio can decrease

Table 6
The marginal effects of crisis in the first year

Variable	*Coefficient*	*STD. ERR*	*testZ*	*Prob*
GDP	-0.004569	0.002031	-2.25	0.021
INF	0.078089	0.040671	1.92	0.032
LE	-0.002425	0.001183	-2.05	0.33
OP	0.109996	0.040589	2.71	0.004
LI	-0.020938	0.130863	-0.16	0.873
DEP	-0.034674	0.182495	-0.19	0.851
CR	0.032432	0.324321	0.1	0.924
M2	-0.049158	0.026716	-1.84	0.048

Dependent variable is the crisis dummy. Standard errors, Z test and probability are reported.

the probability for the bank to be in economic crisis. There is a direct relation between Bank Openness and the crisis probability in the banking system. Increasing the liquidity of the banking system is negatively correlated with banking crisis. A decrease in exchange rate has a negative effect on the probability of a banking crisis. Also credit ratio increase of GDP and saving money negatively affect the probability of a banking crisis which means that a one unit increase in credit ratio can increase the crisis by 0.032.

Table 7
The marginal effects of crisis for more than a year

Prob	*testZ*	*STD. ERR*	*Coefficient*	*Variable*
0.031	-1.95	0.003272	-0.006381	GDP
0.996	0.01	10.40121	0.104012	INF
0.002	-2.51	0.005444	-0.013665	LE
0.031	2.33	0.010085	0.023498	OP
0.039	-1.88	0.004457	-0.008379	LI
0.94	0.07	0.702386	0.049167	DEP
0.004	2.72	0.316306	0.860351	CR
0.31	1.98	0.007317	0.014487	M2

Dependent variable is the crisis dummy. Standard errors, Z test and probability are reported.

According to the above table, economic growth (GDP) has a significant negative effect on the probability of the bank to have economic crisis in the second year.a one unit increase in economic growth can decrease the crisis by 0.006. Inflation has a positive effect on the probability of a banking crisis since it causes instability in the banking system when savings decrease and loan requests increase which in turn leads to crisis in the banking

system.A one unit increase in inflation would increase the probability of having crisis in the second year by 0.104increasing money savings and bank credits also increase banking crisis. Increasing the liquidity of the banking system is negatively correlated with banking crisis. A one unit increase in liquidity would decrease the probability of having crisis by 0.008. Leverage ratio has a significant negative effect on the probability of having crisis because the more this ratio increases, the more the ration of having unexpected crisis will be. A one unit increase in leverage ratio would decrease the probability of having crisis in the second year by 0.013.

5. THE COEFFICIENTS SIGNIFICANCE ANALYSIS

There are several tests for analyzing coefficientssignificant in multinomial Logit regression approach one of which is the likelihood ratio test. In this test, the null hypothesis indicates that the variable coefficient under study is zeroand that the alternative hypothesis reflects the effect of the independent variable on the dependent variable. The teststatistic has a chi-square distribution with two degrees of freedom.

The estimated statistic compared with Chi-squared table with two degrees of freedom, but if the likelihood ratio statistic if the statistical is more than that of the Chi-squared table; the assumption that the independent variable is significantcannot be rejected. The results of this test for the multinomial Logit model are shown in the table below.

Table 8
The likelihood ratio test

Variable	*Chi2*	*df*	*Prob*
GDP	13.607	2	0
Inf	16.985	2	0
LE	9.36	2	0.003
OP	11.846	2	0.001
LI	0.581	2	0.446
DEP	1.085	2	0.581
CR	8.049	2	0.042
M2	14.778	2	0

According to the above table, the variables of economic growth (GDP), inflation (Inf), leverage (LE), Openness (OP), the ratio of credit to GDP growth (CR) and the ratio of M2 to foreign exchange reserves of the Central Bank (M2) are not statistically zero because the estimatedprobability for these variables is less than 0.05 therefore the first hypothesis is not rejected

as well. Also, the variables of Rate of change of the nominal exchange rate (DEP) and liquidity (LI) do not have a significant effect on the financial crisis, becausethe estimated probabilities for these variables are more than 0.05.

6. TESTING THE INDEPENDENCE OF IRRELEVANT CONSEQUENCES

One of the limitations of the multinomial logit approach is that the discrimination between the m consequencesis limited to a series of binary comparisons between the consequences that are not affected by the characteristics of other consequences.

One of the assumptions of the multinomial logitmodel is that the conditional probability does not depend on other consequences. In order to check the independence of consequences, the Hausman test is used. In fact, the independence of irrelevant results hypothesis should be established. In this test, the null hypothesis means that there is independence of the consequences and the first hypothesis indicates the dependence of the consequences. The results can be seen in the table below.

Table 9
Hausman Test

Omitted	*Chi2*	*df*	*Prob*
nocrises	39.095	6	0.00
A year of crisis	-1.282	6	1.00
More than a year of crisis	-1.665	6	1.00

According to the above table, there is a correlation between consequences when there is nocrisis since the estimated probability is less than 0.05 so the alternative hypothesis cannot be rejected. For the crisis for one year mode, independence of consequenceshypothesis cannot be rejected since the estimated probability is 1 which is more than 0.05 therefore the null hypothesis (independence of variables) cannot be rejected. Also, the independence hypothesis cannot be rejected for the case of having crisis for more than a year.

7. RESULTS AND SUGGESTIONS

According to the results,the economic growth has a negative significant effect variable negative impact on of the banking crisis because economic growth reduces the crisis by increasing the quality of the banking system.

Therefore, it is suggested to stabilize economic growthin order to prevent the banking crisis increase.

Inflation variable also has a positive Significant effect on the banking crisis sinceit causes instability in the economy,prevents people from saving their money and increases their tendency forgetting loans and leads to crisis in the banking system. Therefore, measures should be taken to prevent high inflation rates .Therefore, monitoring and controlling inflation should be pursued as a primary goal in the monetary and fiscal policies.

Regarding the significant positive effectof openness on the banking crisis, It is suggested that authorities rethink banking arrangements and planning system to ensure that capital outflows don't exacerbate the probability of a banking crisis.

Depreciation variable has also a significant positive effect on the banking crisis. If variables such as exchange rate stability are unnoticed, the country will face balance of payments crisis by any negative shock in foreign exchange reserves. Thus, having a strong foreign exchange reserves to cushion the shock of the currency can be an appropriate tool to prevent the banking crisis.

Leverage ratio Variablewhich is obtained from the banking system capital ratio to deposits ratio had a negative effect the banking crisis. Therefore, it is suggested that people increase capital ratio to deposits ratio to prevent banking crisis.

Saving money variable (the ratio of foreign exchange reserves of the central bank's money to the money volume) has a significant negative effect on the banking crisis. Therefore, it is suggested that people increase the ratio of foreign exchange reserves of the central bank's money to the money supply to prevent banking crisis.

The results indicated that economic growth, inflation and leverage have the greatest impact on the banking crisis on banking balance sheets. Therefore the importance of the macro-economic sector characteristics and financial stability of the banking sector isproven. However, most countries lack a macro-prudential framework, and most legislators haven't had a specific purpose in preventing the formation of crisis. It is recommended that financial legislators in these countries continue their efforts in strengthening regulatory capacity in collaboration with international organizations.

Finally, the fact that financial crisis patterns are useful tools for policymaking, but should not replace financial legislators'judgment. It is

clear that even at the international levels, financial crisis patterns are only used as a troubleshooting tool for economy. As a result, updating such patterns for monitoring macroeconomic performance and troubleshooting policies in community macroeconomic management can be useful. These models can be used for the causesof financial crisis formation in the country.

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