TÜRKİYE CUMHURİYET MERKEZ BANKASI

WORKING PAPER NO: 14/19

Does Effectiveness of Macroprudential Policies on Banking Crisis Depend on Institutional Structure?

June 2014

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DOES EFFECTIVENESS OF MACROPRUDENTIAL POLICIES ON BANKING CRISIS DEPEND ON INSTITUTIONAL STRUCTURE? [1]

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Abstract

The question of why some countries suffer from crises, while some others can escape from them, is challenging. Empirical evidence suggests that countries with stronger financial institutions are more durable to the wind of crises. In this paper, we investigate empirically whether the link between the supervision of the banking system and crisis probabilities depends on the institutional structure. We find that effectiveness of the prudent supervision of the financial sector in lowering the probability of banking crises is more pronounced in countries with stronger institutions.

Keywords: *banking crisis, institutions, banking supervision, panel data*

JEL Classification*: G01, G18, G21, G28, C33, O11*

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[1] I am very grateful to Semih Tümen for providing me his careful supervision, valuable time and invaluable comments and remarks at every stage of this study, which have greatly improved the paper to its final version. I am also very thankful to Olivier Coibion for his encouraging comments to the earlier version of this paper.

The views expressed in this paper are those of the author and do not reflect the official views of the Central Bank of Turkey. All errors are my own.

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".. macroeconomic policies are not the major cause of crises, and more likely symptoms of underlying institutional problems… even without the bad macroeconomic conditions, economic crises might occur due to weak institutions."

Acemoğlu et al. (2003)

1. Introduction

A variety of factors and forces can lead to the emergence of a financial crisis in a country. A study by Demirgüç-Kunt and Detragiache (1998) concludes that although financial liberalization increases the likelihood of banking crises, that probability decreases the stronger the institutional conditions for liberalization such as lack of corruption and bureaucratic interference and respect for the rule of law are in place[3]. For instance, for the Asian crisis, it is argued that it reflects the deeper problem of governance, which "*stems from a mix of political patronage, financial sector fragilities, weak corporate governance and lax bankruptcy laws*"[4]. According to Corbett et al. (1999:209), Asian crisis was the "*consequence of insufficient institutional development in the region during the miracle boom period*". Under the scheme of close government and business relationship[5] as happened in East Asia, financial institutions extended loans to politically well-connected borrowers. This leads to moral hazard problem, as both lenders and borrowers feel the guarantee that their actions will be covered by implicit government guarantees. It is argued that implicit guarantees in the financial system were one of the major flaws during the period of liberalization. Therefore, one of the factors that created vulnerability in Asia was the presence of a bank-based financial regime in which "*there was implicit promises of a government bailout of the financial system in the event of bad out-turns*"[6]. Here, the problem is that *"in a context of politics of patronage, prudent regulation and supervision of the financial sector becomes difficult and bankruptcy laws become lax. Thus, overindulgent behavior by the private sector becomes institutionalized and sows the seeds of a financial crisis"*[1].

[3] Demirgüç-Kunt and Detragiache (1998)
[4] Chowdhury and Islam (2001:6)
[5] This is called "crony capitalism" or the politics of patronage.
[6] Corbett et al. (1999: 191)

Our main concern in this study is to question the role of institutional framework, more specifically democracy in preventing banking crisis, through its effect on the soundness of the financial institutions. Looting behavior and fraud are the characteristics of "institutionally weak societies"[7]. Therefore, this current study proceeds from the argument that the failure to democratize polity successfully creates an environment for financial institutional weaknesses, which carry the potential of leading to banking crisis. For instance, looting behavior is argued to have been at the root of the crises in the USA and Chile in the late 1970s[8]. Therefore, On the other hand, it should be reminded that "*domestic governance failures cannot explain why and when the crisis began, since such failures had persisted for some time before the crisis*"[9].

Similarly, very recently, in mid-February 2014, it is reported that the Chinese banking system has extended $14 trillion to $15 trillion in the span of five years, mostly through shadow banking channels, which is expected to lead to massive problems in the financial system. The problem with the Chinese financial system is simply stated as the scale. In other words, problem is the magnitude of the credit that has increased over such a short amount of time. These serious troubles that China is experiencing today in the banking system carry the potential of ending up with a serious financial crisis. While on the one hand, these problems reflect weaknesses of the prudential regulation and supervision of the banking system, on the other hand, it seems like either legal remedies against fraud are easy to avoid or the system allows fraud to go unpunished.

As regards the association between institutional weaknesses and banking crises, failures in the regulation and supervision of the financial system is regarded as "*fundamental cause of the crisis*" as stated in the Leaders' Statement of the 2009 G-20 London Summit in April 2009. Barth et al. (2013:1) argue that "… *the more than 100 systemic banking crises that have devastated economies around the world since 1970, ... reflect, at least partially, defects in bank regulation and supervision*". Weak regulation and supervision has been held at least partly responsible for leading to crises in countries ranging from the United States and Japan, to Korea and Mexico, Chile, Thailand on the one hand, to India, Russia, Ghana and Hungary, on the other[10]. The most striking and strong arguments in this context have been

[7] This terminology belongs to Acemoğlu et. al. (2003)
[8] Akerlof and Romer (1993)
[9] Walter (2002:1)
[10] Barth et al. (1999:1)

raised for the Asian crisis[11]. Especially after the Asian crisis, weak prudential regulation and supervision[12] is regarded to have led to financial sector vulnerability, which was claimed to be at the root of the Asian crisis[13]. Furthermore, it is even asserted that it would have been possible to avoid the Asian crisis if banks had been well supervised[14].

The approach to view weakness of the regulation and supervision of the financial system as a major component of vulnerability to crisis is supported by empirical evidences as well. An important study in this area that introduces financial institutional factors to the empirical evaluation of the banking crisis is the work by Demirgüç-Kunt and Detragicahe (1998). An interesting finding of this study in terms of our purpose in the current study is that structural characteristics, such as the availability of deposit insurance and the degree of "law and order" achieved by a country, are found to be relevant in terms of affecting the probability of a banking crisis. The relevant literature that focuses on both the role of regulatory framework of the banking sector and other institutional factors such as corruption and deposit insurance is, Barth et.al. (2002), Demirgüç-Kunt and Detragicahe (2000), Ganioğlu (2007), Hardy and Pazarbaşıoğlu (1999), Klomp (2010), Puopolo et al. (2011), Rossi (1999), Noy (2004), Zarrouk and Ayachi (2009).

In this study, we attempt to introduce institutional framework into the analysis of banking crises being inspired by the empirical evidence put forward by Acemoğlu et al. (2003) that institutional factors are responsible for leading to cross country differences in economic volatility and on the severity of crisis[15]. According to this approach, problems at the root of the crises were not mismanaged macroeconomic policies but structural in nature and reflect the underlying institutional problems of the countries[16]. Within this framework, even when the governments pursued sound macroeconomic policies, if they failed to establish

[11] The non-crisis countries in East Asia by contrast, Singapore, Hong Kong and Taiwan had very strong prudential supervision (Mishkin, 2001:8)

[12] Previously, Diaz-Alejandro claimed that both premature financial liberalization and lax prudential regulation had been instrumental in the Chilean crisis in the early 1980s. See Diaz-Alejandro (1985)

[13] Boorman et al. (2000:5)

[14] Williamson (1999:10), Intal et al. (2001:43)

[15] Severity of crises is measured by the largest output drop. See Acemoğlu et al. (2003:90).

[16] The issue why greater instability is expected in institutionally-weak societies and the channels through which institutions are linked to economic instability in institutionally-weak societies are briefly explained as follows: There are few constraints on rulers, i.e, there is lack of effective constraints on politicians and politically powerful groups in these societies. Since having/controlling political power provides gains, there will be increasing willingness of various groups to fight to come to power and enjoy these gains. Furthermore, in societies with institutional problems, politicians may be forced to pursue unsustainable policies to satisfy some groups and remain in power. When these policies are abandoned, volatility may arise. Furthermore, in a society with weak institutions, entrepreneurs may invest in sectors/activities from which they can withdraw their capital more quickly. This contributes to potential economic instability (Acemoğlu et al. (2003)).

adequate institutional arrangements to supervise and monitor activities especially in the financial and banking sectors, these institutional weaknesses lay the basis of subsequent crises. Henceforth, the main argument is that the crises might reflect the effect of institutional factors on economic outcomes (Acemoğlu et al., 2003).

Empirical model in this study is basically based on the analysis carried by Demirgüç-Kunt and Detragiache (1998). This current research complements that of Demirgüç-Kunt and Detragiache (1998) by addressing the role of institutional factors, as there is relatively little empirical evidence that supports the impact of institutional factors on banking crisis. The reason for the absence of adequate empirical evidence in the literature is the lack of detailed cross-country comparisons of institutional framework and the difficulty of obtaining adequate measures to describe the institutional structure. The problem is stated by J.Klomp and J. de Haan (2009:312) that "*there exists a measurement problem as democracy and other dimensions of the political system are not directly observable. In the empirical literature several indicators have been suggested to capture (dimensions of) a country's political system. All these measures are imperfect indicators of latent constructs, like democracy*".

We initially ask the question of "Is the weak banking sector supervision and regulation a major contributor to banking crisis?" and going beyond that we ask "What is the relative role of institutional structure in the generation of the crisis, especially when examined together with variables related to the supervisory and regulatory framework?".

We try to answer these questions using a cross country database that includes both developing and developed economies over the period 1970-2008 in an empirical model with a logit specification. Choice of explanatory variables in this study reflects many of the factors suggested by the theory and empirical studies[17]. To proxy institutional framework, Acemoğlu et al. (2003) use the constraint on the executive variable from the Polity IV dataset, which measures the extent of constitutional limits on the exercise of arbitrary power by the executive. In this current study, we also use Polity IV dataset to introduce the impact of institutional structure[18].

[17] Clasessens and Köse (2013) provide a comprehensive survey of the literature on financial crises.
[18] As claimed by Klomp and De Haan (2009) that Polity IV indicators are not really measuring institutions, also based on the idea of Glaeser et al. (2004). Hence, following Klomp and De Haan (2009), we also use the term institutions in a very broad sense and consider it as synonym of "dimensions of the political system".

This paper can be viewed as extending the existing literature by showing the strong impact of institutionalization over the effectiveness of banking supervision in preventing banking crisis. The test results indicate that banking regulation and supervision is a major factor in the prevention of crises, which give important support to the propositions led by international agencies in the aftermath of Global Financial Crisis. Hence, the significance of regulatory and supervisory framework of the banking system is once more justified. Major contribution of this paper comes with the introduction and interaction of institutional framework with the banking supervision. The main message of this paper is the finding that institutionalization, particularly democratization of institutions, affect the probability of banking crisis and raise the effectiveness of banking supervision on probability of banking crisis. In a system where institutional democracy has not flourished, prudential regulation and supervision of the financial sector stays weak and create a suitable environment for banks, which want to exploit the existence of moral hazard and can lead to a financial breakdown as in the case of Chinese financial system today.

This paper is organized as follows: Section 2 is devoted to the explanation of empirical specification of the model, data and variables used. Section 3 discusses empirical findings and robustness check. Section 5 concludes.

2. Empirical Specification

Econometric Model

The probability of banking crisis is estimated using multivariate logit model. This approach is based on the study of Demirgüç-Kunt and Detragiache (1998). Within this approach, a banking crisis dummy is created and takes value of one in the case of a crisis or zero if there is no crisis. Therefore, the dependent variable in this study is the banking crisis dummy, i.e., a binary variable. Only the first year of the crisis is denoted as one and crisis beyond that first year is excluded to avoid the endogeneity problem.

We estimate the following logit specification based on Demirgüç-Kunt and Detragiache (1998). The log-likelihood function of the model is defined as:

$$P\left(\text{BANKCR}_{it} \mid X_{it-1}\right) = \begin{cases} P(i,t) \; if \; \text{BANKCR}_{it}=1 \\ 1\text{-}P(i,t) if \; \text{BANKCR}_{it}=0 \end{cases}$$

$$\text{Ln L} = \sum_{t=1....T} \sum_{i=1....n} P(i,t) \ln\left\{F\left[\beta' X(i,t)\right]\right\} + \left[1-P(i,t)\right] \ln\left\{1-F\left[\beta' X(i,t)\right]\right\}$$

The probability that a crisis occurs at a particular time in a particular country is assumed to be a function of a vector of explanatory variables. *t* denotes time, *i* represents country. *P (i,t)* denotes the probability that a crisis occurs in country *i* at time *t*. X_{it} is the vector of n explanatory variables. β is a vector of n unknown coefficients and $F\left[\beta' X(i,t)\right]$ is the cumulative probability distribution function at $\beta' X(i,t)$. In this study, this probability distribution function is assumed to be logistic. Then, the probability of having a banking crisis is defined as:

$$\text{logit}\left(E\left[P(i,t) \mid X_{it-1}\right]\right) = \text{logit}(P(i,t)) = \ln(P(i,t)/(1-P(i,t)) = \beta . X_{it-1}$$

We used the lagged values of explanatory variables in the model in order to minimize feedback from the crisis to the control variables[19]. Fixed-effect panel logit estimation technique is used for the analysis on the basis of Hausmann test results. This has allowed for the possibility that the dependent variable can vary independently of the explanatory variables. The estimated coefficients in this model do not express the increase in the probability of a crisis given a one-unit increase in the explanatory variables. The coefficients, on the other hand, represent the impact of a change in an explanatory variable on $\ln(P(i,t)/(1-P(i,t))$. The sign of the coefficients gives the direction of the change. On the other hand, the magnitude depends on the slope of the cumulative distribution function at $\beta' X(i,t)$.

[19] In the literature, see Lambregts and Ottens (2006), Barrell et al. (2010), Ito (2004), Klomp (2010), Noy (2004) for applying the same methodology.

The Data

Although banking crises of developing countries are examined more often in the literature[20], studies related to banking crises of developed countries are very few, since banking crises in developed countries are rather rare events. Hence, this study chooses to focus on both developed and developing countries' experience of banking crises.

The data set has annual data for 45 countries (24 developed and 21 developing) and covers the period of 1970-2008. Countries included in the sample are the following: *Developed countries* are Austria, Australia, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States. *Developing countries* are Argentina, Brazil, Chile, China, Colombia, Egypt, Hungary, India, Indonesia, Malaysia, Mexico, Morocco, Peru, Philippines, Poland, Russia, Sri Lanka, Thailand, Turkey, Venezuela and Zimbabwe.

Banking Crises Variable

There is no agreed definition of crises in the literature, therefore, we adopted the definition of Laeven and Valencia (2012:4)[21] and based banking crisis series on database of Laeven and Valencia (2012). In Appendix 2, a detailed list of systemic banking crises[22] is presented. Laeven and Valencia (2012) define a banking crisis as systemic if two conditions are met:

1) Significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and bank liquidations); and

2) Significant banking policy intervention measures in response to significant losses in the banking system".

[20] McKinnon and Pill (1997); Kaminsky and Reinhart (1999)

[21] This definition is similar to those that was used by Bordo et al (2001) and Reinhart and Rogoff (2008). Bordo et. al. (2001) defines a banking crisis as a period of "financial stress resulting in the erosion of most or all of aggregate banking system capital", and Reinhart and Rogoff (2008) define a crisis to be "one of two types of events: (i) bank runs that lead to closure, merger or takeover by the public sector of one or more financial institutions, (ii) in the absence of runs, closure, merger, takeover or large-scale government assistance of an important financial institution (or group of institutions) that marks the start of a string of similar outcomes for other financial institutions".

[22] For a discussion on systemic crises, see Claessens et al. (2004). For the definition of banking crises, see Claessens and Köse (2013).

Choice of Explanatory Variables

There are different explanations about how crises occur. In the literature, both theoretical and empirical analyses of the crises point to different conclusions. Empirical analyses obtain different results as regards to the impact of explanatory variables, hence there is no agreement on which explanatory variables to include. One of the reasons for that there is no single way of measuring the explanatory variables. Furthermore, sample selection affects the results as both the crises included in the sample as well as the definition of crisis differ. Therefore, these models have not been successful in generating a consensus, as apparent from controversial views in the literature.

We choose the candidate explanatory variables both on the basis of the theory of the determinants of banking crises and the existing empirical studies[23]. Based on the literature, the variables employed in this study can be split into three groups: *macroeconomic* and *institutional variables.* As regards the dataset, Appendix 1 provides information about all variables by name, definition, sources and the time period that the data covered.

Macroeconomic Variables

We initially decide on which elements of macroeconomic environment is included in the empirical analysis as explanatory variables. We control for the macroeconomic factors such as: *current account balance* (*CABGDP*); *bank private credit* (*BANKPRVCREDGDP*); *liquid liabilities* (*LIQUIDLIAB (M3)*); *stock market capitalization* (*STOCKMRKCAPITAL*); *general government consumption* (*GENGOVCONS*); *inflation rate* (*INF*); *GDP per capita growth* (*GDPPCGR*); *GDP growth rate* (*GDPGR), log GDP per capita growth* (*LOGPERCAP), world growth rate (WORLDGR).*

Current account imbalances itself is not a traditionally employed variable in the empirical literature of predicting banking crisis. Even though some indicators of external pressures on the economy and financial system are included in the analysis, the main argument is that developed countries are less vulnerable to external pressures leading to banking crises than developing countries. Reinhart and Rogoff (2009) argue that widening current account imbalances was one of the common leading indicators of banking crises in OECD countries. Hardy and Pazarbaşıoğlu (1999) estimate the model for both developed and

[23] For a survey of the studies of the determinants of Banking Crises, see Demirgüç-Kunt and Detragiache (2005). See also Claessens and Köse (2013).

developing countries and find the current account as not significant. In the study of Jorda et al. (2010), credit boom over the previous 5 years is indicative of a heightened risk of financial crisis, and is a superior predictor of financial crisis than current account imbalances. Eichengreen and Rose (1998) as well find that current account is not a significant predictor of banking crises in developing countries. Ganioğlu (2013) find the robust significance of current account imbalances in leading to crises in developing countries, carrying a stronger risk of increasing the probability of banking crises than that of credit expansion. This study (Ganioğlu, 2013) also finds the significant impact of current account imbalances in raising the probability of banking crisis in developed countries as well.

In order to introduce crisis characteristics, i.e., the existence of a boom in the run-up to the crisis as measured by credit and money growth preceding the crisis, we have included *bank private credit* (*BANKPRVCREDGDP*)*;* and *liquid liabilities* (*LIQUIDLIAB (M3)*) as regressors. In the aftermath of the global financial crisis, a new interest sparkled about the fluctuations in monetary aggregates and credit as well as their roles in the amplification, propagation and generation of shocks especially during financial distress[24]. The view that has been influential especially after the global crisis is that excessive credit growth generates risks such as "imbalances" and "financial instability"[25] and involves important information for policy makers monitoring financial and economic stability especially about the likelihood of future financial crises. Analysis of Schularick and Taylor (2010) clearly suggests that "the credit system matters above and beyond its role as propagator of shocks as in the financial accelerator model. The credit system seems all too capable of creating its very own shocks, judged by how successful past credit growth performs as a predictor of financial crises". Even though the association between excessive credit expansion and financial crises[26] is not new, the empirical evidences regarding this relationship are very few. In two recent studies[27], credit booms appear as a strong predictor of financial crisis. In Schularick and Taylor (2010) study, credit booms are stronger predictor of financial crisis than monetary aggregates. In the study of Jorda et al. (2010), credit boom over the previous 5 years is indicative of a heightened risk of financial crisis, and is a superior predictor of financial crisis than current account imbalances.

[24] Mendoza and Quadrini (2010)
[25] Borio and Lowe (2002, 2003); Goodhart (2007)
[26] Kindleberger (1978); Hume and Sentence (2009); Reinhart and Rogoff (2009); Caprio and Honohan (2008)
[27] Schularick and Taylor (2009); Jorda et.al. (2010). In both studies, the analysis covers 14 developed countries for the period of 1870-2008.

We included inflation rate as a proxy of macroeconomic mismanagement. According to Demirgüç-Kunt and Detragiache (1998) [28], high inflation is likely to be associated with high nominal interest rates, which may have adverse impacts on the economy and the banking system. We include GDP per capita to control for differences in economic development. World growth rate is included in order to control for the global economic conditions.

Institutional Variables

In this study, we aim to embrace institutional variables into the analysis beyond macroeconomic variables. One of the major challenges to introduce institutional variables into the analysis is the difficulty of finding those variables across time series.

The financial/banking institutional factors are included in this study in order to capture the fact that banking sector problems may be due to weaknesses in the prudential regulation and supervision[29]. This institutional variable is Banking Supervision Index (*BANKSUPERV*). *BANKSUPERV* is from the dataset described in Abdul et al. (2008). We used standardized form of this index.

In order to control for the impact of institutional framework on banking crises, we introduce a number of variables that represent the different dimensions of the system of a country. The institutional variables introduced by Acemoğlu et al. (2003) are from the Polity IV dataset, which measures the extent of constitutional limits on the exercise of arbitrary power by the executive. Following Acemoğlu et al. (2003), we have used the Polity IV dataset that report a qualitative score for every independent country. The Polity IV variables we have used are: Institutionalized Democracy (*DEMOC*), Institutionalized Autocracy (*AUTOC*), Revised Combined Polity Score (*POLITY2*), Executive Constraints (Decision Rules) (*XCONST*), Regulation of Participation (*PARREG*), The Competitiveness of Participation

[28] The macroeconomic factors that are controlled by Demirgüç-Kunt and Detragiache (1998) are inflation, rate of growth of real GDP, external terms of trade, ratio of credit to the private sector to GDP, rate of depreciation of the exchange rate, ratio of M2 to foreign exchange reserves, government surplus as a percentage of GDP, ratio of bank cash and reserves to bank assets and real short-term interest rate. Demirgüç-Kunt and Detragiache (1998) found low GDP growth, excessively high real interest rates, high inflation significantly increased the likelihood of systemic problems.

[29] Demirgüç-Kunt and Detragiache (1998) include indexes of the quality of the legal system, of contract enforcement and of the bureaucracy and deposit insurance scheme as regressors.

(*PARCOMP*), Executive Recruitment (*EXREC*) and Political Competition (*POLCOMP*)[30]. We used standardized form of these indexes.

3. Empirical Results

In this section, we examine the regression results. We work with a panel data set that contains annual observations for each country over the period 1970-2008. We later test the robustness of results to the choice of empirical specification. Since one of the purposes in this study is to make a comparison between developed and developing countries as well in terms of triggering factors of banking crises, econometric model is estimated initially involving both of these two country groups. Then, to allow for a comparison, estimations are carried for each country group separately.

All explanatory variables defined in the previous section are used in different specification of regressions. Macroeconomics variables are: *INF*, *CABGDP*, *BANKPRVCREDGDP*, *LIQUIDLIAB(M3)*, *STOCKMRKCAPITAL*, *GDPGR*, G*DPPCGR*, *LOGPERCAP*, *GENGOVCONS*, *WORLDGR*. Among macroeconomic variables *BANKPRVCREDGDP*, *LIQUIDLIAB(M3)* and *STOCKMRKCAPITAL* are used interchangeably in the regressions. Qualitative *institutional* variables include *banking supervision index* (***BANKSUPERV***) and *Polity IV* variables: ***DEMOC, AUTOC, POLITY2, XCONST, PARREG, PARCOMP, EXREC* and *POLCOMP*.** For the series of regressions with different *institutional* measures, all regressions included a standard list of macroeconomic variables -*CABGDP*, *BANKPRVCREDGDP*, *GENGOVCONS*, *INF*, *GDPGR*, G*DPPCGR*, *LOGPERCAP*.

Table 1 present the results from panel logit regressions with fixed effects. In the first three regressions (1-3), only the macroeconomic variables are included in the regressions. The only change between these regressions is the interchangeably used indicators such as *BANKPRVCREDGDP*, *LIQUIDLIAB (M3)* and *STOCKMRKCAPITAL*. One of the striking results to note is that all of these variables have been noticed as significantly contributing to the likelihood of a banking crisis. Furthermore, we found that high rate of current account imbalances also has been indicative of an increasing risk of financial crisis in all regressions from (1) to (9). An important point to note here is that widening current account imbalances

[30] Detailed description of each Polity IV variable, which changes over time, is provided in Appendix 1.

and credit expansion together have been a significant and robust factor in raising the likelihood of financial crises as can be viewed in all regressions from (3) to (9). In regression (1), an expression of monetary expansion *LIQUIDLIAB (M3),* and in regression (2), stock market capitalization *STOCKMRKCAPITAL,* are found to have contributed significantly to the probability of crisis. Beyond these macro indicators, inflation rate has also been statistically significant in raising the risk of financial crises in regressions (1) to (3). Monetary aggregate *LIQUIDLIAB (M3)* has not been as robust as stock market capitalization *STOCKMRKCAPITAL* or credit extended to private sector *BANKPRVCREDGDP* in raising the probability of financial crises.

In regression (4), the coefficient of banking supervision variable is highly significant as expected, suggesting positive impact of a regulatory environment of banking sector in lowering the probability of a banking crisis. In regressions from (5) to (9), various *Polity IV* variables are included so as to capture the different dimensions of the system of a country. Banking supervision variable continues to be highly significant in these regressions as well. An increase in *DEMOC* (Institutionalized Democracy), *POLITY2* (Combined Polity Score computed by subtracting the *AUTOC* score from the *DEMOC* score), *XCONST* (Executive Constraints (Decision Rules) that indicates extent of institutionalized constraints on the decision making powers of chief executives, whether individuals or collectivities), *PARREG* (Regulation of Participation, where participation is regulated to the extent that there are binding rules on when, whether, and how political preferences are expressed), *PARCOMP* (Competitiveness of Participation which refers to the extent to which alternative preferences for policy and leadership can be pursued in the political arena), *EXREC* (Executive Recruitment Political Competition), *POLCOMP* (Political Competition), and a decrease in *AUTOC,* (Institutionalized Autocracy) significantly lowers the probability of a banking crisis.

Here, implication of these findings is important in the sense that the coefficient of banking supervision variable increases when joined by institutional variables. In other words, this implies that when only banking supervision variable is included in the regression, the impact of banking supervision variable is understated. On the other hand, when accompanied with institutional variables its impact gets stronger in lowering the probability of banking crisis, which means that its explanatory power increases. In other words, institutional framework is important both in terms of institutionalizing the supervision of the banking

system and in terms of its sustainability and strength. This relationship between institutional variables and banking supervision can also be viewed from the following regression:

$$BANKSUPERV = -0{,}021 + 0{,}42\ DEMOC$$

Those findings for developing countries also suggest that both institutions and macroeconomic policies have independent effects on the likelihood of a banking crisis. Confirming the regression results of Acemoglu et al. (2003), we also found that the impact of institutions is mediated by macroeconomic variables, as there is a significant change in the coefficient of the institutional variables in the specifications with and without macroeconomic variables[31]. Additionally, in this study, we have found that there is a change in the coefficient of banking supervision variable when complemented with institutional variables, suggesting that impact of banking supervision gets stronger in countries with stronger institutions.

[31] We have not reported these specifications here.

Table 1: Panel Regressions (All Countries)

Logit Fixed-Effect Model Regression
Dependent Variable: Banking Crisis

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)	
							MACROECONOMIC VARIABLES											
CABGDP $_{t-1}$	-0.19	***	-0.36	***	-0.19	***	-0.16	***	-0.15	***	-0.16	***	-0.16	***	-0.15	***	-0.14	**
	(0.05)		(0.09)		(0.05)		(0.06)		(0.06)		(0.06)		(0.06)		(0.06)		(0.06)	
BANKPRVCREDGDP $_{t-1}$					0.06	***	0.05	***	0.06	***	0.05	***	0.05	***	0.06	***	0.06	***
					(0.01)		(0.02)		(0.02)		(0.02)		(0.02)		(0.02)		(0.02)	
LIQUIDLIAB (M3) $_{t-1}$	0.03	**																
	(0.01)																	
STOCKMRKCAPITAL $_{t-1}$			0.02	***														
			(0.01)															
GENGOVCONS $_{t-1}$	0.08		0.05		0.10		0.13		0.17	**	0.16	**	0.17	**	0.17	**	0.18	**
	(0.07)		(0.16)		(0.07)		(0.08)		(0.08)		(0.08)		(0.08)		(0.08)		(0.08)	
INF $_{t-1}$	0.43	**	0.61	**	0.31	*	0.09		0.04		0.03		0.03		0.06		0.08	
	(0.18)		(0.26)		(0.18)		(0.19)		(0.20)		(0.20)		(0.20)		(0.20)		(0.21)	
GDPPCGR $_{t-1}$	0.01		0.01	***	0.02		0.01		0.02		0.02		0.02		0.02		0.02	
	(0.01)		(0.02)		(0.01)		(0.01)		(0.02)		(0.01)		(0.02)		(0.01)		(0.01)	
GDPGR $_{t-1}$	0.01		0.00		0.03		0.00		-0.01		-0.02		-0.02		-0.01		-0.02	
	(0.05)		(0.08)		(0.05)		(0.05)		(0.06)		(0.06)		(0.06)		(0.06)		(0.06)	
LOGGDPCAPGR $_{t-1}$	0.85	**	2.30	***	-0.01		0.49		1.05	*	1.06		1.10	*	1.00		0.95	
	(0.35)		(0.76)		(0.36)		(0.53)		(0.63)		(0.66)		(0.65)		(0.63)		(0.64)	
							INSTITUTIONAL VARIABLES											
BANKSUPERV $_{t-1}$							-1.33	***	-1.66	***	-1.64	***	-1.67	***	-1.61	***	-1.61	***
							(0.49)		(0.56)		(0.55)		(0.56)		(0.55)		(0.56)	
																	-0.07	
WORLDGR $_{t-1}$																	(0.13)	
							POLITICAL INSTITUTIONAL VARIABLES											
DEMOC $_{t-1}$									-0.92	**							-1.07	**
									(0.43)								(0.48)	
AUTOC $_{t-1}$											0.56	*						
											(0.32)							
POLITY2 $_{t-1}$													-0.76	**				
													(0.38)					
XCONST $_{t-1}$ *															-0.62	**		
*parreg, parcomp, exrec, polcomp															(0.32)			
No of observ.	1098		569		1084		715		649		649		654		649		645	
LR chi2(df)	44.9		53.9		72.1		36.26		41.95		40.53		41.81		41		40.99	
Prob>chi2 (p value)	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	

Notes: *** 1 percent significance level, ** 5 percent significance level, *10 percent significance level. Standard-errors are provided in the parenthesis.

Empirical test results in Table 2, which provides a comparison between developed and developing countries, underline mainly the impact of two macroeconomic variables, namely current account imbalances and domestic credit trends for both country groups. Current account imbalances and domestic credit extension variable are highly significant for developing countries, while credit trends are more robust in raising the probability of financial crisis than current account imbalances for developed countries, consistent with the literature[32]. A higher inflation rate is also strongly associated with banking crises for developed countries. These macroeconomic variables seem to have predictive power when used in isolation for developed countries, but statistical significance is lost when used in conjunction with some institutional explanatory variables such as banking supervision variable. Since institutional variables, especially the level of democracy do not vary much across time for developed countries since 1970s, regressions involving those institutional variables from dataset *Polity IV* are not reported for developed countries.

For developing countries, stricter banking supervision of the banking sector reduces the probability of banking crises in regression (3) and again the coefficient of banking supervision variable increases when complemented with institutional variables. Almost all institutional variables have been significant in affecting the probability of banking crisis except AUTOC. That is to say, an increase in variables of *DEMOC, POLITY2, XCONST, PARREG, PARCOMP, EXREC* and *POLCOMP* lowers the probability of banking crises significantly in developing countries.

On the other side, the fact that there is a change in the coefficient of banking supervision variable when complemented with institutional variables suggests that banking supervision is more effective in lowering the probability of banking crisis in institutionally-strong developing countries. This can be interpreted other way around as in institutionally-weak societies[33], which is characterized by looting behavior and fraud, "*a weak financial system that allows fraud to go unpunished should increase the probability of a banking crisis*"[34]. In a liberalized financial system, if banking supervision is weak and legal remedies against fraud are easy to circumvent, "*banking crises may be caused by widespread looting:*

[32] The same findings in Ganioğlu (2013) as well.
[33] Acemoğlu et al. (2003) use the terminology "institutionally weak societies".
[34] Demirgüç-Kunt and Detragiache (1998:8)

bank managers not only may invest funds in projects that are too risky, but they may invest in that are sure failures but from which they can divert money for personal use"[35].

Table 2: Panel Regressions

Logit Fixed-Effect Model Regression
Dependent Variable: Banking Crisis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	developing	developed	developing	developed	developing	developing	developing	developing
				MACROECONOMIC VARIABLES				
CABGDP $_{t-1}$	-0.22 ***	-0.13 *	-0.18 ***	-0.12	-0.18 ***	-0.17 ***	-0.18 ***	-0.18 ***
	(0.06)	(0.08)	0.07	(0.11)	(0.07)	(0.07)	(0.07)	(0.07)
BANKPRVCREDGDP $_{t-1}$	0.058 ***	0.06 ***	0.05 ***	0.046	0.05 ***	0.05 ***	0.05 ***	0.05 ***
	(0.02)	(0.02)	0.02	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
LIQUIDLIAB (M3) $_{t-1}$								
STOCKMRKCAPITAL $_{t-1}$								
GENGOVCONS $_{t-1}$	0.127	0.04	0.14	0.103	0.14	0.14	0.13	0.14
	(0.09)	(0.17)	0.09	(0.17)	(0.09)	(0.09)	(0.09)	(0.09)
INF $_{t-1}$	0.2	1.3 **	0.05	0.43	0.01	0.03	0.00	0.00
	(0.19)	(0.61)	0.20	(0.71)	(0.21)	(0.21)	(0.21)	(0.20)
GDPPCGR $_{t-1}$	0.024 **	0.02	0.02	0.00	0.02	0.02	0.02	0.02
	(0.01)	(0.03)	0.01	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)
GDPGR $_{t-1}$	-0	0.17	-0.01	0.033	-0.02	-0.02	-0.02	-0.02
	(0.06)	(0.15)	0.06	(0.17)	(0.06)	(0.06)	(0.06)	(0.06)
LOGGDPCAPGR $_{t-1}$	-0.39	1.26	0.49	0.557	1.00 *	0.92	1.07	0.89
	(0.45)	(0.79)	0.65	(1.00)	(0.73)	(0.72)	(0.75)	(0.71)
				INSTITUTIONAL VARIABLES				
BANKSUPERV $_{t-1}$			-1.62 ***	-0.90	-1.89 ***	-1.82 ***	-1.89 ***	-1.84 ***
			0.67	(0.80)	(0.72)	(0.70)	(0.71)	(0.69)
				POLITICAL INSTITUTIONAL VARIABLES				
DEMOC					-0.83 **			
					(0.43)			
AUTOC								
POLITY2							-0.69 **	
							(0.38)	
XCONST*						-0.54 *		
						(0.32)		
								0.86 *
*parreg, parcomp, exrec, polcomp								(0.51)
No of Obs.	495	589	452	263	447	447	452	447
LR chi2(df)	26.76	53.0	29.0	8.51	32.18	31.26	32.18	31.3
Prob>chi2 (p value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: *** 1 percent significance level, ** 5 percent significance level, *10 percent significance level. Standard-errors are provided in the parenthesis.

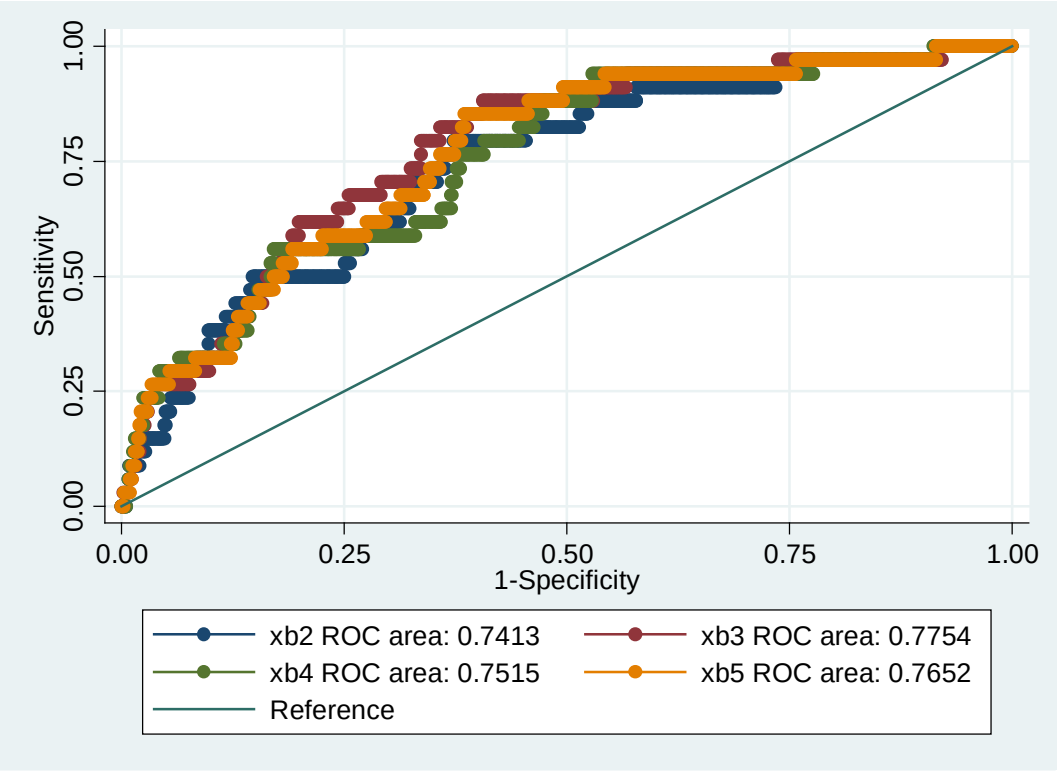
[35] Demirgüç-Kunt and Detragiache (1998:8)

3.1. Robustness Check

Predictive ability of the model is tested for the regressions (4), (5), (6) and (7), using ROC curve analysis, which is shown in Figure 1. xb2 ROC area represents predictive ability of regression (4), xb3 ROC area represents that of regression (5), xb4 ROC area represents that of regression (6) and xb5 ROC area shows predictive ability of regression (7).

The area under the ROC curve for the regressions (5) is the greatest one among those regressions. Furthermore, predictive ability of the models (5), (6) and (7) is greater than predictive ability of the regression (4), where only the banking supervision is involved in the regression as institutional variable. In other words, integration of institutional variables to the regression raises predictive ability of the model. Thereby, predictive ability test results confirm the conclusion from the regression analysis that banking supervision is more effective in lowering the risk of financial crisis in institutionally-strong countries.

Figure 1: Predictive Ability Testing ROC curve comparison



4. Conclusion

We intend to analyze banking crises with an approach, which is somewhat different from the prevailing "crisis literature" in this study. Unlike the standard explanations, we attach utmost importance to the role of institutional factors on the probability of banking crises. The reason why we turn attention specifically to the impact of the institutional characteristics is the claim put forward by Acemoğlu et al. (2003) that institutional factors lead to cross country differences in volatility and crises. That is to say, the question of why some countries suffer from crises, while some others can escape from it is explained by a standing point that even without the bad macroeconomic conditions, economic crises might occur due to weak institutions. Hence, the problem in institutionally weak societies is the inability to deal with their own economic shocks, and perhaps more importantly their shocks, which is claimed to have first-order importance by Acemoğlu et al. (2003). It is asserted that macroeconomic problems are symptoms of deeper institutional causes[36]. The main argument is that bad macroeconomic outcomes and volatility arise from the power struggle to control the state to take advantage of the resulting rents, which is a characteristic of institutionally weak societies[37].

Proceeding from this argument, we investigate empirically whether the link between the supervision of the banking system and crisis probabilities depends on the institutional structure, in particular on the level of democracy. Hence, contrary to the emphasis in the literature on poor macroeconomic policies in the analysis of crises, our approach takes financial and institutional dimension as the starting point. The question of which macroeconomic policies matter for the crises is important only after institutions are taken into account.

[36] Acemoğlu et al. (2003)
[37] Ibid.

Empirical findings suggest that the nature of the banking crises is associated with the institutional structure as well as the macroeconomic conditions of the economy. We find institutional weaknesses as the major reasons behind banking crises, especially in developing countries. Furthermore, empirical evidence suggests that effectiveness of the prudent supervision of the financial sector in lowering the probability of banking crises is more pronounced in more intitutionalized countries.

If crises are believed to emerge primarily from embedded institutional imperfections, then a sustainable resolution lies in large-scale institutional reform. As policy recommendation, it is concluded that once a solid institutional system is established, measures taken to strengthen the financial system is more effective in lowering the probability of banking crisis. Thus, in order to prevent banking crises, the policy-makers should focus more on the institutional factors.

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APPENDIX 1: Description of Variables and Sources

Variable Name		Definition	Source
	Macroeconomic Variables		
BANKING CRISIS	Systemic Banking Crisis	Dummy Variable, where 1 indicates a crisis.	Laeven and Valencia (2012)
CABGDP	Current Account Balance (percent of GDP)		World Development Indicators (WDI) online database, World Bank
INF	Inflation	Natural log of (1+ CPI Growth Rate)	World Development Indicators (WDI) online database, World Bank
BANKPRVCREDGDP	Bank private credit (percent of GDP)	The financial resources provided to the private sector by domestic money banks as a share of GDP. Domestic money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.	International Financial Statistics (IFS) - International Monetary Fund (IMF)
LIQUIDLIAB (M3)	Liquid liabilities (percent of GDP)		International Financial Statistics (IFS) - International Monetary Fund (IMF)
STOCKMRKCAPITAL	Stock market capitalization (percent of GDP)		Standard & Poor's, Global Stock Markets Factbook and supplemental S&P data
GENGOVCONS	General Government Final Consumption (percent of GDP)		World Development Indicators (WDI) online database, World Bank
GDPPCGR	GDP per capita growth	Growth rate of GDP per Capita (Constant 2000 USD)	World Development Indicators (WDI) online database, World Bank

Variable Name		Definition	Source
	Institutional Variables		
GDPGR	GDP growth (annual, percent)		World Development Indicators (WDI) online database, World Bank
BANKSUPERV	Banking Supervision Index		Abiad, Abdul, Enrica Detragiache, and Thierry Tressel, "A New Database of Financial Reforms," IMF Working Paper WP/08/266, December 2008 (http://www.imf.org/external/pubs/cat/longres.cfm?sk=22485.0)
DEMOC	Institutionalized Democracy	Democracy is conceived as three essential, interdependent elements. One is the presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders. Second is the existence of institutionalized constraints on the exercise of power by the executive. Third is the guarantee of civil liberties to all citizens in their daily lives and in acts of political participation.	Polity IV Dataset http://www.nsd.uib.no/macrodataguide/set.html?id=32&sub=1

Variable Name		Definition	Source
	Institutional Variables		
AUTOC	Institutionalized Autocracy	In mature form, autocracies sharply restrict or suppress competitive political participation. Their chief executives are chosen in a regularized process of selection within the political elite, and once in office they exercise power with few institutional constraints.	Polity IV Dataset
POLITY2	Revised Combined Polity Score	The POLITY score is computed by subtracting the AUTOC score from the DEMOC score; the resulting unified polity scale ranges from +10 (strongly democratic) to -10 (strongly autocratic).	Polity IV Dataset
XCONST	Executive Constraints (Decision Rules)	Operationally, this variable refers to the extent of institutionalized constraints on the decision making powers of chief executives, whether individuals or collectivities.	Polity IV Dataset

Variable Name		Definition	Source
	Institutional Variables		
PARREG	Regulation of Participation	Participation is regulated to the extent that there are binding rules on when, whether, and how political preferences are expressed. One-party states and Western democracies both regulate participation but they do so in different ways, the former by channeling participation through a single party structure, with sharp limits on diversity of opinion; the latter by allowing relatively stable and enduring groups to compete nonviolently for political influence.	Polity IV Dataset
PARCOMP	The Competitiveness of Participation	The competitiveness of participation refers to the extent to which alternative preferences for policy and leadership can be pursued in the political arena.	Polity IV Dataset

Variable Name		Definition	Source
	Institutional Variables		
EXREC	Executive Recruitment	Executive Recruitment: Concept variable combines information presented in three component variables: XRREG (Regulation of Chief Executive Recruitment), XRCOMP (Competitiveness of Executive Recruitment), XROPEN (Openness of Executive Recruitment).	Polity IV Dataset
POLCOMP	Political Competition	Concept variable combines information presented in two component variables: PARREG (Regulation of Participation) and PARCOMP (The Competitiveness of Participation)	Polity IV Dataset

APPENDIX- 2: Banking Crises

Country	Banking Crisis (year of start)
Argentina	1980, 1989, 1995, 2001
Austria	2008
Australia	-
Belgium	2008
Brazil	1990, 1994
Canada	-
Czech Republic	1996
Chile	1976, 1981
Colombia	1982, 1998
China	1998
Denmark	2008
Egypt	1980
Finland	1991
France	2008
Germany	2008
Greece	2008
Hungary	1991, 2008
India	1993
Indonesia	1997
Ireland	2008
Israel	1977
Italy	2008
Japan	1997
Korea	1997
Malaysia	1997
Mexico	1981, 1994
Morocco	1980
New Zealand	-
Netherlands	2008
Norway	1991
Peru	1983
Philippines	1983, 1997
Poland	1992
Portugal	2008
Russia	1998, 2008
Spain	1977, 2008
Sri Lanka	1989
Sweden	1991, 2008
Switzerland	2008
Thailand	1983, 1997
Turkey	1982, 2000
United Kingdom	2007
United States	1988, 2007
Venezuela	1994
Zimbabwe	1995

Source: Laeven and Valencia (2012:24-26)

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