

Macprudential Policies and their impact on Banking Crisis Management in Balkan Region

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This article aims to study the role of macroprudential affairs in the framework of financial stability. In a narrow perspective this study will deepen in estimating whether macroprudential policies can prevent a possible banking crisis. Many studies have examined the effects of macroprudential policy on credit growth, but few empirical studies have analyzed its effect on the probability of a banking crisis. This paper empirically investigates the effect of macroprudential policy on the probability of a banking crisis. Specifically, using data for 11 Balkan countries from 2006 to 2020, through a probit and logit model it is analyzed the effect of changes in macroprudential policy and a set of other variables on the probability of crisis occurrence. The results highlight the importance of policy coordination between different government bodies to design an appropriate macroprudential policy. The findings of this study state that monetary regulations, such as interest rate and inflation are the main factors that drive the probability of a banking crisis occurrence.

Keywords: macroprudential policies; banking crisis; financial stability; Balkan Region

1 Introduction

In the current global turmoil of the economic crisis caused by the coronavirus, macroprudential policy may be one of the most important macroeconomic policy tools to avoid an economic crisis turning into a financial crisis. During times of crisis, there is a common concern that there may be large capital outflows from emerging markets and developing economies, which may lead to liquidity pressures in local or foreign currencies in financial sector. This can create adverse reactions especially when exchange rate depreciations are large and currency mismatches are common. If the crises lasts longer, the real estate sectors are also likely to be strongly affected, which in turn could lead to reinforcement from falling asset prices. In this circumstance, the establishment of macroprudential policy or capital flow measures is mostly considered among policy makers.

In terms of financial regulation and supervision, the global financial crisis has highlighted the need to go beyond a simple micro-based approach. There is a

growing consensus among policymakers that a macroprudential approach should be adopted. Policymakers are currently working on implementing macroprudential policy tools and frameworks, whose efforts involve coordination between central banks, governments, and regulatory authorities.

1.1 Research focus and Objectives

This article aims to address the question of whether macroprudential policy affects the probability of preventing a banking crisis. Hence, the purpose of this paper is to analyze macroprudential policies, their role in the economy and in preventing possible financial crises. Based on the review of the existing literature and the framework of current policy concerns, this paper identifies several key research questions, which would be particularly useful to address and implement macroprudential policy instruments.

The main objectives of this paper are: (i) to analyse macroprudential policies; (ii) to analyze the role of macroprudential policies in preventing the banking crisis; (iii) to analyse the role of these policies in supporting the financial stability of the system.

2 Literature Review

The recent financial crisis has highlighted the lack of analytical frameworks to help predict and effectively deal with sudden increases in financial imbalances. There has been a failure to assess how aggressive risk-taking is by different types of financial institutions against the macroeconomic backdrop. Overconfidence in the self-regulatory ability of the financial system led to an underestimation of the consequences, rising debt and leverage.

During the crisis period, an insufficient recognition of the role of financial innovation in mitigating financial imbalances and their consequences in the real economy was found. Consequently, the number of research papers and conferences discussing a macro perspective on financial regulation has increased significantly. There is a growing consensus among policymakers that a macroprudential approach should be adopted.

One of the most popular measures is related to the regulatory framework, namely the adoption of the third Basel Accord, which is considered the main response to the shortcomings caused by the financial crisis, in two additional security systems: countercyclical mitigation and capital conservation mitigation, activated in case of excessive lending and protects banks from deterioration of the loan portfolio when the trend of the economic cycle changes. The Basel III agreement is a controversial topic which in the existing literature has two sides; economists like Ayadi R, Arbak E, DeGroen W. (2012) who support the main benefits of its implementation and

specialists like BIS (2011) and Ojo (2010) who worry about the higher costs of implementing the new rules with effects on lending and economic growth.

Basel III emerged after two sets of regulations (Basel I and Basel II) which were oriented towards microprudential risks, ignoring the importance of a fragile banking system. The effects of the current regulation issued by the Basel Committee have been studied in relation to their implications on banking welfare, where it will significantly increase the quality of banks' capital and the required level of their capital.

Since the global financial crisis in 2008, macroprudential policy has attracted considerable attention from policymakers as one of the main macroeconomic policy tools for sustainable economic development. In the current context of a widespread Covid-19 crisis across countries, macroprudential policy is once again attracting more attention globally.

2.1 Objectives of Macroprudential Policy

The main objectives of macroprudential policy are: (i) strengthening the financial system's resistance to shocks and economic imbalances and (ii) limiting the spread of the international financial crisis (Forbes, 2021). In addition to these objectives, the actions to minimize the costs caused by financial instability, to reduce the disparity between the settlement date of assets and liabilities, credit incentives for applicants to use it effectively, etc. were also pointed out.

In general, macroprudential policy is seen as aiming at financial stability, but there is no common definition of financial stability. The different views can be broadly divided into two groups. The first, referred to Padoa Schioppa (2003) Allen and Wood (2006) defines financial stability in terms of the stability of the financial system against external shocks. The second, according to Schinasi (2004) emphasizes the endogenous nature of financial distress and describes financial stability in terms of resilience to shocks coming from within the financial system while Borio and Drehman (2009) describe it as vulnerability to financial distress in response to shocks of normal size and not large strokes

2.2 Related Theory

Macroprudential regulations include a diverse set of tools focused on the stability of the entire financial system. They focus on the growth of systemic risk over time, as well as how weaknesses in individual institutions can spread or interact with other policies to affect the entire system and the overall economy. In certain situations, there is little difference between macroprudential regulation and other types of tools - such as microprudential regulation and capital controls. More specifically, microprudential regulation, which focuses on the stability of individual financial

institutions, may be similar to macroprudential regulation in countries where the financial system is dominated by a small number of financial institutions.

Capital controls, which are taxes or regulations based on an investor's residency, can be similar to macroprudential regulations that focus on the investment currency. After the global financial crisis, international institutions, central banks, and other policy forums launched major initiatives on how to mitigate macro-financial weaknesses. From those discussions, it emerged that three related objectives for macroprudential policy should be prioritized: (i) addressing excessive credit expansion and strengthening stability in the overall financial system; (ii) reduction of key mechanisms of systemic risk amplification; (iii) mitigation of structural weaknesses related to the role of important institutions in the main markets.

Macroprudential policy and Banking Crisis

Banking crises have been one of the main causes of economic disruption and instability. Babecky et al. (2014) found that compared to other types of financial crises, banking crises are the costliest in terms of overall output loss. This approach is line with the study of Shehu (2016), and Shehu and Musta (2017), who state that the instability of the country comes mainly from the financial and banking system. Considering Albania, where more than 90% of the financial system is dominated by the banking system, having a solid and profitable banking industry, will of course contribute in a stable economic system in overall.

To avoid disruptive banking crises, macroprudential policies have been implemented in many countries. The empirical literature has studied the effectiveness of macroprudential policy in financial markets. Cihak, Demirguc-Kunt, Martinez Peria and Mohseni-Cheraghloo (2013) documented that, countries facing a crisis condition, exhibited lower current capital ratios, were less stringent in their regulatory treatment of bad loans, were less able to require banks to regulate their own capital, provisions or compensation schemes and had weaker incentives for private agents to monitor banks.

Related areas of research have examined the intersections of macroprudential policy and other types of policy such as monetary policy and capital controls. For example, Korinek and Sandri (2016) found that both capital controls and macroprudential policy lead to financial stability by reducing net capital inflows as well as the amount and riskiness of financial liabilities. Bruno, Shim and Shin (2017) found that macroprudential policy is more effective if it is complemented by monetary policy. Kim and Mehrotra (2018) found similar effects of monetary and macroprudential policies on credit growth, implying a complementary use of the two policies in normal times as well as a challenge for policymakers during periods when strong credit growth coincides with low inflation.

Recently, a growing body of literature on macroprudential policy is developing theoretical models to study how macroprudential regulations can reduce the probability of a financial crisis. Flemming, L'Huillier and Piguillem (2019) found

that when the cumulative amount of borrowing is high enough, it is optimal to use tax debt to make agents internalize the systematic externality of their decisions.

Theoretical models to study the relationship between macroprudential policy and other macroeconomic policies, are also becoming more numerous. Ghilardi and Peiris (2016) used a DSGE model and found that macroprudential policy can usefully complement monetary policy. Alpanda, Cateau and Meh (2019) found that LTV regulations are the most effective and least expensive policy tool to deal with home loan imbalances, followed by bank capital regulations and monetary policy, respectively.

Mendoza and Rojas (2019) showed that the optimal policy is to tax domestic credit or capital inflows, and therefore capital controls as a separate instrument are not justified. In contrast, Schmitt-Grohé and Uribe (2017) found that the optimal macroprudential capital control policy should be tightened when the debt-to-sales ratio becomes high after the interest rate decline, i.e. an accommodative monetary policy.

3 Data Design and Methodology

In this paper, the effects of macroprudential policy on the probability of a banking crisis were analysed using an annual data set consisting of 11 Balkan countries within a 15 year timespan, from 2006 to 2021. The data is generated for Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Slovenia, Kosovo, Serbia, Greece, Montenegro, Northern Macedonia, and Rumania. The initial observations were 240 and after trimming the data from "outliers" and missing data, the total observations went to 213 and the data were checked for heteroskedasticity. The analysis is based on a probit and logit regression, due to the binary type of the variable.

The table below summarises the variables used in this article. The first column depicts the variable name, the second column indicated the proxy used as an indicator for this variable, the third column stated the expected relationship of the independent variables with the explained variable, banking crisis. This relationship is generated as an expected relationship, based on the insights that previous studies and literature provides. The last column states the abbreviation used for this variable.

Table 1: Variable Description

Variable Name	Proxy	Expected relation.	Abbrev.
Banking Crisis	Indicator to measure financial stability of the banking system. This variable is generated as a dichotomic variable, taking binary values, 0 for stable banking situation and 1 for not stable (banking crisis).		B_Crisis
Currency	The exchange rate (ER) represents the number of units of one currency that is exchanged for one unit of another currency. It is calculated as an annual average based on monthly averages (local currency units relative to the US dollar). This Indicator is used to measure the currency power in forex market	-	Forex
Economic Growth	Gross Domestic Product (GDP) is the standard measure of value added created by the production of goods and services in a country over a given period. This indicator is used to measure economic power and stability of a country	-	GDP
Inflation	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of purchasing a basket of goods and services that may be fixed or changed at certain intervals, such as annually. This Indicator is used to measure consumers power through Laspeyres formula.	+	CPI
Interest rate	Indicator to measure monetary policy in the framework of investment power	+	IR
Macroprudential Policy	Indicator to measure financial stability. MPP is a variable that consists in 17 Instruments, such as: Countercyclical buffer, Conservation buffer, Capital requirements, Leverage requirements, Provisioning requirements, Credit growth limits, Loan restrictions, Limits on Foreign Currency Loans, Loan-to-value limits, Debt-to-income limits, Levy/Tax on Financial Institutions, Liquidity measures, Loan to deposit limits, Limits on FX operations, Reserve requirements, SIFI surcharges and other components	-	MPP

The data for this study were generated as secondary data downloaded from International Financial Statistics (IFS), Instat and Macroprudential Policy (iMaPP). This database contains information on the change in the gross domestic product, data on the exchange rate, inflation, and data on the change in the interest rate as one of the instruments of monetary policy. The initial database was with 240 observations and 6 variables.

The collected data were combined (pull data). Data was merged, trimmed and the final database consisted in 213 observations. The data is reported on a quarterly basis. Pandemic was excluded from the analysis on purpose since it is considered a “one time event”. Covid 19 pandemic, in the framework of this study can be considered an outlier, since this study is mainly focused on analysing macroprudential

regulations and their effect in preventing a possible banking crisis, under a normal economic state.

A "banking crisis" variable was also created through coding a dichotomous variable (dummy) that only takes the values 0 and 1. The value 1 is given for periods of crisis (low GDP or interest rates have been negative) and the value 0 is a value when the period is normal, so there is no banking crisis.

Based on the nature of the variables (binary data), the analysis was computed through a probit and logit regression. In a Probit regression, the standard cumulative normal distribution function Φ is used to model the regression function when the dependent variable is binary. Hence, we assume:

$$E(Y | X) = P(Y=1 | X) = \Phi(\beta_0 + \beta_1 X) \quad (1)$$

where, $\beta_0 + \beta_1 X$ plays the role of a quantile z ,

provided that $\Phi(z) = P(Z \leq z)$, where $Z \sim N(0,1)$

such that the Probit coefficient in the original equation (1) expresses the change in z associated with a one-unit increase or decrease in X . Although the effect on z of a change in X is linear, the relationship between z and the dependent variable Y is nonlinear as Φ is a nonlinear function of X . Since the dependent variable is a nonlinear function of the regressors, the coefficient X does not have a simple interpretation.

Logit regression function:

$$P(Y = 1 | X_1, X_2, \dots, X_k) = F(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k)}}$$

This model is similar to Probit regression, except that one uses the cumulative distribution function (CDF) of another real-valued random variable X :

$$F(x) = \frac{1}{1 + e^{-x}}$$

Logit and probit differ in how they define $F(x)$. The logit model uses the cumulative distribution function of the logistic distribution. The probit model uses the cumulative distribution function of the standard normal distribution to determine $F(x)$. Both functions will take any number and rescale it to fall between 0 and 1. Therefore, whatever $\beta_0 + \beta_X$ equals can be transformed by the function to give a predicted probability

5.1 Odds ratio /relative risk for the logit model

The odds ratio or relative risk is:

$$5.1.1 \quad \frac{p}{(1-p)}$$

and measures the probability that $y=1$ relative to the probability that $y=0$

$$p = \frac{\exp(x'\beta)}{1 + \exp(x'\beta)}$$

$$\frac{p}{1-p} = \exp(x'\beta)$$

$$\ln \frac{p}{1-p} = x'\beta$$

This study also uses the probit model to estimate the probability of a banking crisis. The regression equation to determine the relationship between macroprudential policy and the probability of a banking crisis is defined as follows:

$$Pr(y_{i,t} = 1|x_{i,t}) = \Phi(x_{i,t}\beta) + \varepsilon_{i,t}$$

where Pr is the probability, indicates the country, while t indicates the year; y is a dummy variable that takes the value of one if a banking crisis occurs and zero if not; x is the set of independent variables; Φ is the cumulative normal distribution; β is a vector of maximum likelihood estimation; and ε is a term used for errors.

6 Main Findings

This section provides empirical insight and findings related to the effect of the variables mentioned in table 1 (see section above) in the probability of a banking crisis.

Table 2 shows a summary of the descriptive statistics of the final dataset. As shown in the table below, 213 observations are taken into consideration for the quantitative analysis.

Table 2: Descriptive summary

Variables	No. Obs	Mean	Std Dev	Minimum	Maximum
BCrisis	213	0.93896	0.292372	0	1
FOREX	213	29.0754	45.99629	1.24	130.63
GDP	213	5.03227	8.131516	-10.64	21.45
CPI	213	3.06816	2.845431	-4.88	14.97
IR	213	2.92995	2.638128	0.01	14.32
MPP	213	0.20657	0.405799	0	1

As stated in the table below, the correlation between macroprudential policy and banking crisis, seems to be very weak. Hence, it is not possible to predict the significance and magnitude of the relationship of Macroprudential Policy and banking crisis.

The correlation seems to be very weak for the rest of the variables. Forex and GDP have a negative relationship with banking crisis, indicating that when the currency depreciates, the probability for a banking crisis increases. Meanwhile, in periods of low (or negative) economic growth, the chances of a banking crisis tend to increase.

Table 3: Spearman Correlation matrix

	<i>BCrisis</i>	<i>FOREX</i>	<i>GDP</i>	<i>CPI</i>	<i>IR</i>	<i>MPP</i>
B_Crisis	1.0000					
FOREX	-0.1306	1.0000				
GDP	-0.1503	0.4847	1.0000			
CPI	0.3606	-0.2097	-0.1204	1.0000		
IR	0.30495	-0.1373	-0.0666	0.4789	1.0000	
MPP	-0.0450	-0.0254	0.0135	0.0093	-0.0543	1.0000

On the other side, in line with previous studies, the correlation table above, depicts that Inflation and interest rates have a positive (weak) relationship with occurrence of a banking crisis. Hence, an increase in inflation will stimulate a possible banking crisis, as well as an increase in interest rates, will discourage the investments, reduce GDP and lead to a possible recession (if all other variables are kept constant).

Before developing the tests, the variance inflation factor analysis was computed and some of the variables were excluded. The table below, depicts the results of the empirical analysis.

Table 3: Empirical Findings

Panel A: Probit regression output

BCrisis	Coef.	Std. Err.	z	p> z 	95% Conf	interval
CPI	0.259***	0.049	5.27	0.000	0.162992	0.3560
IR	0.249***	0.050	4.93	0.000	0.150182	0.3482
MPP	-0.211	0.317	-0.67	0.505	-0.83306	0.4105

Panel B: Logit regression output

BCrisis	Coef.	Std. Err.	z	p> z 	95% Conf	interval
CPI	0.471***	0.095	4.95	0.000	0.284856	0.65823
IR	0.448***	0.094	4.73	0.000	0.2625156	0.6341802
MPP	-0.424	0.650	-0.65	0.514	-1.699213	0.8506275

Based on the results mentioned in the table above, under ceteris paribus condition, for the given dataset, it is provided that in overall monetary policy has a significant impact in the occurrence of a banking crisis. Furthermore, this model provides that a high inflation scenario, leads to a possible banking crisis and high interest rates, increase the likelihood of a banking crisis.

Under these results, the economic stability is shaken during high inflation or high interest rates. Inflation reduces and shrinks the consumption power, meanwhile high interest rate discourages investments, enterprises and contribute to a lower GDP for the country. The lower the GDP, the lower the economic growth, and the higher the probability for a recession.

Considering macroprudential policies, results of this study, do not provide a significant contribution of macroprudential regulations to the occurrence of a banking crisis. This result indicates that other variables such as monetary regulations are more important, hence more attention should be paid to monetary policy, contributing in this framework to a better financial stability.

Table 4: Odds ratio

Variable	Odds Ratio	chi2(1)	P>chi2	95% Conf	interval
FOREX	0.991	2.94	0.0865	0.981	1.0012
GDP	0.945	3.77	0.0521	0.893	1.0005
CPI	1.699	41.28	0.0000	1.445	1.9981
IR	1.731	37.99	0.0000	1.453	2.0613
MPP	0.654	0.43	0.5125	0.182	2.3512

Considering the findings from the odds ratio table, these findings can be summarized:

- A banking crisis is 0.99 times more likely to occur than the foreign exchange rate.
- A banking crisis is 0.94 times more likely to occur than gross domestic product.
- A banking crisis is 1.69 times more likely to occur than inflation.
- A banking crisis is 1.73 times more likely to occur than the interest rate.
- A banking crisis is 0.65 times more likely to occur from macroprudential policies. But since p-value>0.05, the variable is not statistically significant

In overall, this section in terms of a quantitative perspective shows that a banking crisis can be driven mainly from the monetary instruments, rather than macroprudential policies. Nevertheless, since the countries taken into analysis are mainly developing countries, the use of these policies remains a challenge.

CONCLUDING REMARKS

The dataset of 11 countries of Balkan Region is a considerable dataset to draw credible conclusions. Nevertheless, quantitative approach is not always a one way out. Regarding the empirical findings of this article, it is found that only monetary instruments play a decisive role in preventing a banking crisis. Macroprudential regulations (consisting here in a combination of 17 instruments) do not have a significant impact on a banking crisis. Hence the hypothesis fails to meet.

Considering a qualitative approach, and the fact that all the countries analysed are developing countries, these macroprudential policies and regulations should strengthen. They may not be the most important factor, but economists (in line with the findings mentioned in the literature review section) agree that these regulation have a contribution in the financial stability of a country.

In terms of GDP, it is found that higher economic growth is associated with a lower probability of a banking crisis. This is also consistent with economic theory, because if the economy grows faster, borrowers can make higher profits, and therefore, it is easy for them to repay the debt. In this situation, commercial banks are less likely to face borrower defaults, and therefore higher economic growth will lead to a lower probability of a banking crisis.

This article concludes that most important factors that can directly prevent a banking crisis are those related to monetary policy, such as inflation and interest rate. Inflation reduces and shrinks the consumption power, meanwhile high interest rate discourages investments, enterprises and contribute to a lower GDP for the country. The lower the GDP, the lower the economic growth, and the higher the probability for a recession.

The interaction with the exchange rate regime is negative for open economies, suggesting that when they have more flexible exchange rates, these countries have more difficulty controlling overall credit. This may be because exchange rate appreciations (depreciations) associated with capital inflows (outflows) further exacerbate the domestic boom and disrupt financial cycles. There is limited support for this view although from regressions using interactions with financial openness, the coefficient of openness is only positive and statistically significant for developing countries.

Policy makers and financial regulatory authorities should be very careful about drawing lessons from the experiences of other countries. This is because the effectiveness of macroprudential policy varies significantly between countries that have different monetary policy frameworks, exchange rate policies, and capital flow measures.

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