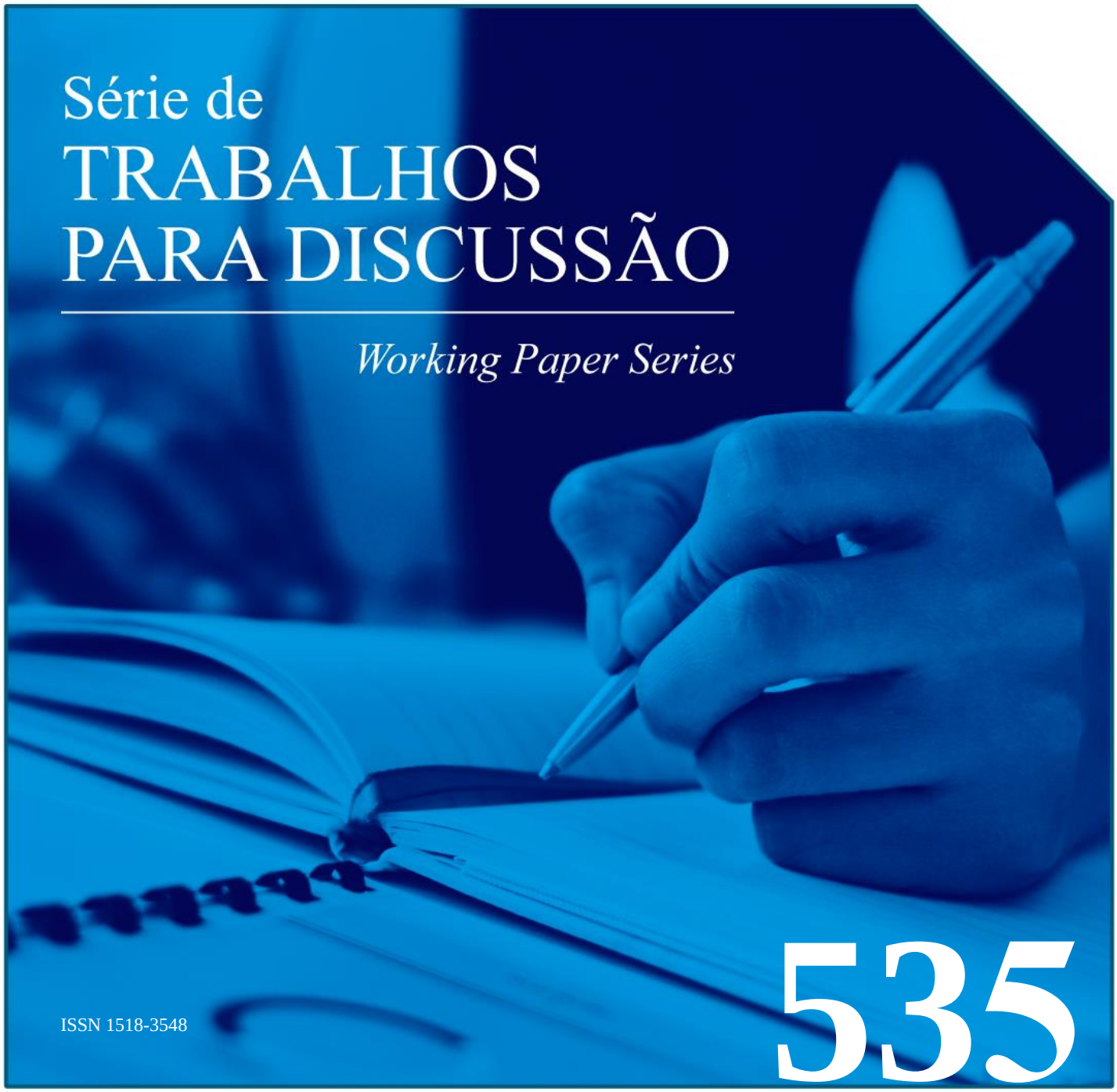

SEPTEMBER 2020

What is the Importance of a Country's Banking Market for Financial Development?

Cláudio Oliveira de Moraes, José Américo Pereira Antunes, Márcio Silva Coutinho

BANCO CENTRAL DO BRASIL

ISSN 1518-3548
CGC 00.038.166/0001-05

Working Paper Series	Brasília	no. 535	September	2020	p. 1-34

Working Paper Series

Edited by the Research Department (Depep) – E-mail: workingpaper@bcb.gov.br

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Toll Free: 0800 9792345

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Non-technical Summary

Literature supports that the existence of a developed financial system is relevant for economic growth. In this sense, the role of banks in financial development can be analyzed according to three dimensions: the size of markets, financial access, and the ability of financial institutions to offer financial services at low cost and sustainable revenues. This paper examines the hypothesis that the market structure of banks impacts the financial development of countries. In particular, the effect of banking concentration and banking competition on financial development, for a group of 89 countries – 28 developed and 61 emerging countries – from 2006 to 2015, was analyzed.

Although a concentrated banking sector can reduce competition through barriers to new entrants, it is also true that a concentrated banking sector can be competitive (Vives, 2016). In order to avoid controversy, the present study opted for a comprehensive approach, considering independent measures of banking concentration (the total assets of the three or five largest banks, and the Herfindahl -HHI index) and banking competition (Lerner and Boone indices), which together refer to the banking market structure. The main conclusions suggest that a higher degree of banking concentration inhibits financial development. Similarly, a less competitive banking market reduces financial development and credit offer. Therefore, the degree of concentration and banking competition are factors that can restrict financial development and consequently affect economic growth.

Sumário Não Técnico

Um dos vetores do crescimento econômico é a existência de um sistema financeiro desenvolvido. Nesse sentido, o papel dos bancos no desenvolvimento financeiro pode ser analisado segundo três dimensões: o tamanho dos mercados, o acesso financeiro e a capacidade das instituições financeiras oferecerem serviços financeiros a baixo custo e receitas sustentáveis. Este trabalho analisa a hipótese de que a estrutura de mercado dos bancos impacta o desenvolvimento financeiro dos países. Ou seja, foi analisado o efeito da concentração bancária e da competição bancária para um conjunto de 89 países – 28 desenvolvidos e 61 emergentes – do período de 2006 a 2015.

Embora um setor bancário concentrado possa reduzir a competição por meio de barreiras para novos entrantes, também é verdade que um setor bancário concentrado pode ser competitivo (Vives, 2016). Para evitar a controvérsia, o presente trabalho optou por uma abordagem abrangente, considerando medidas independentes de concentração bancária (o total de ativos dos três ou cinco maiores bancos e o índice Herfindahl(HHI)) e de competição bancária (índices Lerner e Boone), que juntos se referem à estrutura de mercado bancário. As principais conclusões sugerem que um maior grau de concentração bancária inibe o desenvolvimento financeiro. Da mesma forma, um mercado bancário menos competitivo reduz o desenvolvimento financeiro e a oferta de crédito dos países. Portanto, o grau de concentração e de competição bancária são fatores que podem restringir o desenvolvimento financeiro e, por conseguinte, afetar o crescimento econômico.

What is the Importance of a Country's Banking Market for Financial Development?

Cláudio Oliveira de Moraes [*]

José Américo Pereira Antunes [**]

Márcio Silva Coutinho [***]

ABSTRACT

This paper analyzes the effect of the banking market on countries' financial development. For this purpose, we use a dynamic panel with annual data, from 2006 to 2015, comprising 89 countries – 28 developed and 61 emerging. The banking market is measured with concentration (total assets of the largest banks in relation to total assets) and competition (Lerner and Boone indexes) metrics. As proxies for measuring the financial development, we use the index developed by Sahay et al. (2015) and Svirydzenka (2016), which covers depth, access, and efficiency, aspects of the financial intermediation provided by banks. The main results suggest that an increase in bank concentration may inhibit the country's financial development and that an increase in competition may increase financial development. In short, an improvement in the banking market (a decrease in concentration or an increase in competition) is relevant to financial development. This result is also verified for emerging countries.

Keywords: concentration, competition, financial development
JES Codes: E44, E58, L11

[*] Banco Central do Brasil, Department of Strategic Management and Specialized Supervision, claudio.moraes@bcb.gov.br

[**] Banco Central do Brasil, Department of Strategic Management and Specialized Supervision, jose.antunes@bcb.gov.br

[***] Caixa Econômica Federal, marcio.coutinho@caixa.gov.br

1. Introduction

This paper analyzes the effect of the banking market on countries' financial development. In particular, we analyze the impact of banking concentration and competition, herein denominated banking framework, on countries' financial development. Using a dynamic panel of 89 countries – 28 developed and 61 emerging – with annual data over the period 2006-2015, our results suggest that the banking market affects the level of countries' financial development. In particular, an increase in bank concentration leads to a reduction in financial development. On the other hand, an increase in competition amplifies financial development. Moreover, we identify that an improvement in the framework of the banking market (a decrease in concentration or an increase in competition) is also relevant for the financial development of emerging economies.

The works that investigate the relevance of financial development since Beck et al. (2000) and Levine (2003) find a positive relationship between financial development and economic growth. Recently, studies involving financial development (Adu et al., 2013; Herwartz and Walle, 2014; Beck et al., 2014; Khoutem et al., 2014; Law and Singh, 2014; Durusu-Ciftci et al., 2016; and Azofra et al., 2018) and income inequality (Seven and Coskun, 2016) were embodied in the literature. At present, a new branch of the literature studies the different aspects of financial development (Sahay et al., 2015). The financial development index proposed by Svirydzenka (2016) allows one to analyze financial intermediation features; therefore, the bank market effect on financial development.

Following Love and Matinez Peria (2014), the structure-conduct-perfomance paradigm assumes a causal relationship among the structure, conduct and performance of the banking industry (Memanova and Mylonidis, 2020). Under this perspective, fewer and larger firms are more likely to engage in anticompetitive behavior, hence presenting market power issues. Our study disentangles the market framework into its components. We unravel the links between banking market structure (concentration) and banking

market conduct (competition) in order to analyze the effects of banking framework on financial development separately.

The literature that combines the investigation of the effects of banking market structure (concentration) and banking market conduct (competition) on financial development is scarce. However, research is fruitful, though ambiguous, when it comes to the relationship between market power and financial stability. As for banking market conduct (competition), literature highlights mixed empirical evidence of the relationship between competition and stability. From the competition-fragility view, as Kasman and Kasman (2015) point out, decreases in market power and profit margins, encouraging additional risk-taking, pose a threat to financial stability. Conversely, the competition-stability view holds that less banking market power drives the cost of credit down, reducing loan default rates, which benefits banking stability (Fungácová *et al*., 2017).

Regarding the effects of banking market structure (concentration) on financial stability, Fu *et al.* (2014) argue that greater concentration fosters financial fragility, considering cross-country data from Asia pacific countries. On the one hand, Ben Ali, Intissar and Zeitun (2015) argue that concentration has a positive impact on financial stability through the profitability channel. Azmi *et al.* (2019) argues that concentration is beneficial for banking stability in economies where Islamic and conventional banks coexist. Regarding the effects of banking competition, Amidu and Wolfe (2013) assert that competition enhances financial stability in developing countries, as long as income generating activities increase, for it is identified as a channel through which competition affects banking insolvency risk. Consistent with this argument, Beck (2008) suggests that competition is not detrimental to banking system stability in a market-based financial system with the necessary supporting institutional framework and proper policies.

The controversy between concentration and competition can also be present in the way banks provide financial services. Cetorelli and Gambera (2001) find evidence that banking concentration supports the growth of industrial sectors that need external financing, making it easier for young companies to access credit. Chauvet and Jacolin (2017) demonstrated a positive impact of financial inclusion on firm growth when the banking market is more competitive, suggesting that financial inclusion and banking competition may complement each other. In turn, the results also suggest that greater

banking competitiveness has a positive impact on firm growth only in countries where firms have a high level of financial inclusion. Moreover, Bara et al. (2017) find that a reduction in banking concentration, as well as an increase in competition, stimulates economic growth.

Although a concentrated banking sector can reduce competition through barriers to new entrants (which could expand financial services offer), it is also true that a concentrated banking sector can be competitive (Vives, 2016). In order to avoid the controversy, our paper chooses to look into a comprehensive approach considering independent measures of bank concentration (total assets of the largest banks in relation to total assets) and bank competition (Lerner and Boone indexes), which together refers to the banking framework. In order to capture the degree of the financial services provided, we use the financial development index developed by Sahay et al. (2015) and Svirydzenka (2016), which reflects three dimensions of financial intermediation: depth, access, and efficiency. Besides, we use credit provided by the financial sector as a percentage of GDP, a long-stablished proxy used in the literature (Beck et al., 2000).

The article is organized as follows. In section 2, we present the data and discuss the empirical methodology. Section 3 presents our main results and section 4, the robustness test. Section 5 concludes.

2. Data and Methodology

The present work makes use of annual data from 2006 to 2015, according to data availability, in an unbalanced dynamic panel with 89 countries. The sample used to investigate the effect of banking framework on financial development consists of 28 developed countries and 61 developing countries, which are reported in the appendix (Table A1). All data were extracted from the International Monetary Fund and World Bank websites and the description of each variable associated with their respective source is detailed in Table A2 in the appendix.

In general, the financial development of countries can be analyzed through two approaches, according to the source of financing: capital markets and financial intermediation as provided by banks. The financial development measure developed by Sahay et al. (2015) and Svirydzenka (2016) allows one to analyze these two approaches separately. In this sense, Financial Institutions Index (FI) reflects three dimensions of financial intermediation: depth, access, and efficiency. Depth means the size of markets; access is the ability of financial institutions to offer individuals and companies access to financial services; efficiency is the capacity of institutions to provide financial services at low cost and sustainable revenues. The second measure used in this study is the domestic credit provided by the financial sector as a percentage of GDP (CRED_GDP), a long-established proxy for financial development commonly used in the literature (Beck et al., 2000; Beck and Levine 2004).

According to Seven and Coskun (2016), financial development presents complex institutional and political dimensions. Therefore, the influence of banking concentration, as well as competition, on financial development can be different depending on country characteristics. This reasoning provides the motivation for a second analysis, which highlights the effects of banking framework, hence concentration and competition, on the financial development of developing countries. Accordingly, the average Financial Institutions Index (FI) in developed countries is higher than in developing ones, as the descriptive statistics across the samples analyzed shown in Table 1 reveal.

Table 1 – Financial Institutions Index Across Samples

	All	Developed	Developing
Mean	0.527	0.745	0.427
Median	0.508	0.767	0.434
Maximum	0.995	0.995	0.743
Minimum	0.127	0.484	0.127
Std. Dev.	0.210	0.143	0.152
Countries	89	28	61

As stated by Berger et al. (2004), the consolidation of banks around the world intensified the debate about the effects of concentration and competition on banks'

performance. Following this argument, this study used two variations of the largest banks' total assets as measures of banking concentration. Following Kasman and Kasman (2015), the first measure aggregates the assets of the five largest banks (Bank_5), while the second measure, derived from Fu et al. (2014), aggregates the assets of the three largest banks (Bank_3). Both measures are scaled by the total assets of commercial banks. As such measures are analogous, we used, as a robustness test for bank concentration, the "Herfindahl Index" (HHI).[1]

Regarding competition measures, this study resorts to measures often used in the literature, such as the Lerner and Boone indexes. Another measure of competition indicated by the literature is the Panzar-Rosse H-statistic. However, as Leon F. (2015) points out, H-Statistic has limitations regarding data availability. Therefore, in our study, we used the Lerner and Boone indexes, which are available for the entire period considered. The Lerner index is a measure of market power (Demirgüç-Kunt and Martínez Pería, 2010). Thus, the higher the market power, the lower the competition. The Boone index measures the degree of banking competition from the elasticity of profits to marginal costs, as Kasman and Kasman (2015) point out. The reasoning that underpins the indicators is that more efficient banks achieve the highest profits. Therefore, an increase in the Boone and Lerner indexes reflects a hindrance to financial intermediaries' competition.

In order to control the effect of banking concentration and competition on financial development provided by banks, we used banking and macroeconomic variables. For that, we followed Kasman and Kasman (2015) and used the ratio of non-performing loans (NPLs) to capture the relation between credit risk and financial development. The capital adequacy ratio (CAR) is used to capture the trade-off between financial stability and financial development. CAR is an international standard that measures a bank's risk of insolvency from excessive losses and equals the equity divided by the risk-weighted assets (De Moraes, Antunes, and Montes, 2016). From financial development literature, the following macroeconomic variables are used: real interest rate (INTR) – Bara *et al.* (2017) use this variable as control in a model whose dependent variable is financial development; annual GDP growth rate (GDP) based on constant local

[1] See, in Section 5, the results for HHI.

currency (Raza *et al.*, 2014); and, concordantly with Chinn, Menzie and Ito (2006); the inflation rate (INFL). Descriptive statistics of variables used are reported in Table 2. Finally, to capture the effects of the subprime crisis on financial development, the dummy CRISIS assumes value 1 for the years 2008 and 2009 and 0 elsewhere.

Table A 2 - Summary Statistic (All Countries)

	Observations	Mean	Median	Maximum	Minimum	Std. Dev.
Financial development						
FI	890	0.527	0.508	0.995	0.127	0.210
CRED_GDP	871	81.951	61.053	357.319	-18.441	65.451
Banking market structure						
Bank Concentration (BANK_5)	875	78.525	79.230	100.000	28.800	14.418
Bank Concentration (BANK_3)	887	63.086	62.490	100.000	20.480	15.958
Bank Competition (LERNER)	781	0.281	0.270	0.940	-0.630	0.150
Bank Competition (BOONE)	884	-0.075	-0.040	1.130	-3.200	0.227
Control variables						
NPL	830	6.129	3.720	47.750	0.200	6.565
CAR	837	16.445	15.800	43.400	1.750	4.647
INTR	852	5.630	4.898	54.680	-42.310	7.687
INFL	883	5.193	3.745	109.681	-35.837	6.875
GDP	889	3.595	3.617	34.500	-20.493	4.246

Control variables : bank nonperforming loans to total loans (NPL); bank regulatory capital to risk-weighted assets (CAR); real interest rate (INTR); inflation as measured by the consumer price index (INFL); annual percentage growth rate of GDP market prices (GDP). Description of each variable associated with their respective source is detailed in table A2 in the appendix.

The use of the dynamic panel, in which the lagged dependent variable is used as an explanatory variable, allows us to analyze the effect of the banking framework (concentration and competition) on financial development, controlled by the persistence effect (De Mendonça and De Moraes, 2018). This is possible because the lagged financial development possesses large part of the explanation of financial development. Therefore, the current degree of financial development is expected to be affected by past financial development as well as by lagged banking variables (NPL and CAR) and lagged macroeconomic variables (INTR, GDP and INFL). Hence, we estimate the following specification:

$$\boldsymbol{Financial\ development_{i,t} = \beta_0 + Financial\ development_{i,t-1} + Banking\ framework_{i,t-1} + Controls_{i,t-1} + Crisis_{i,t} + \varepsilon_{i,t},} \quad (\mathbf{1})$$

where $i = 1,2,3,\ldots,89$ are the countries and $t = 1,2,3,\ldots,9$ is the period in years; $Financial\ development$ is a vector of financial development proxies, such as FI (financial development index) and CRED_GDP (domestic credit provided by the financial sector as a percentage of GDP); $Banking\ market\ framework$ is the set of interest variables associated with banking concentration (Bank_5 and Bank_3) and banking competition (Lerner and Boone indexes); $Controls$ is the set of lagged banking and macroeconomic control variables: NPL, CAR, INTR, GDP and INFL; $Crisis$ is the dummy variable to capture the subprime crisis; and ε is the residual of the estimation.

Despite this advantage, the use of the lagged dependent variable in the models generates bias and inconsistency. To avoid correlation issues between the explanatory variables and the error, resulting in biased and inconsistent estimates, the study makes use of the the dynamic panel data method (GMM), which resorts to instrumental variables to address possible endogeneity issues (Arellano and Bover, 1995). With the purpose of avoiding excess of instruments in the regressions, harming the statistical power of the test, the amount of instruments used in the study is smaller than the number of cross-sections. To confirm the validity of the estimations reported, the test of over-identifying restrictions (J-test) is performed (Arellano, 2003). In addition, the first- and second-order serial auto-correlation tests (AR1 and AR2) are also performed.

3. Empirical Analysis

In this section, we analyze the effects of banking framework on financial development. In particular, the analysis of the effect of banking market structure – concentration – on financial development is presented in Tables 3, 4, 7 and 8, whereas the analysis of banking market conduct (competition) is displayed in Tables 5, 6, 9 and 10.

3.1. Financial Development (FI) and Banking Concentration

This section analyzes the effect of banking concentration on Financial Institutions Index (FI). Table 3 reports the results for the full sample, which comprises all the countries analyzed, and Table 4 presents the results for developing countries. In general, the indicators of banking concentration display negative signs and statistical significance in all models, providing evidence that an increase in banking concentration (BANK_5, BANK_3) leads to a reduction in financial development. These results suggest that countries with a large amount of assets concentrated in a few banks (three or five in our analysis) constrain financial development, i.e., diminish the relevance, accessibility and efficiency of the countries' financial systems.

The credit risk (NPL) presents negative signs and statistical significance in all models, implying that countries exposed to high credit risk may experiment low financial development. Since banking behavior is forward-looking (De Moraes, Antunes and Montes, 2016), the persistence of high levels of NPL may discourage banks to incur in additional risk-taking, leading to low financial development. As for the CAR, the negative signs in all models suggest the existence of a trade-off between capital regulation, measured by the capital adequacy ratio, and financial development. Hence, the more solvent the banks are, the higher the CAR and the lower the financial development.

Regarding the macroeconomic variables, the signs and significance of the GDP coefficients reveal a negative relationship between economic growth and financial development (FI), both in the full sample and in the developing countries analysis. In terms of inflation (INFL) and the interest rate (INTR), the full sample analysis shows evidence that both variables curb financial development. Concerning the developing countries analysis, although INFL and INTR have negative signs in all the models, only the interest rate (INTR) is significant. These results are expected, for financial development is curbed during periods of high interest rates. Finally, the crisis dummy evidences that financial development was adversely affected by the periods of the subprime crisis.

Table 3 - Financial development (FI) and Banking Framework
Regression results of the model - All Countries

	Banking Concentration (BANK_5)						**Banking Concentration (BANK_3)**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
FI (-1)	0.794***	0.829***	0.786***	0.792***	0.789***	0.697***	0.836***	0.897***	0.808***	0.763***	0.858***	0.844***
	(0.032)	(0.044)	(0.051)	(0.068)	(0.056)	(0.070)	(0.025)	(0.025)	(0.049)	(0.065)	(0.059)	(0.075)
BANK_5(-1)	-0.098***	-0.138*	-0.175***	-0.180**	-0.214**	-0.202*						
	(0.034)	(0.071)	(0.064)	(0.077)	(0.084)	(0.107)						
BANK_3(-1)							-0.025**	-0.047**	-0.098*	-0.069	-0.189***	-0.297***
							(0.011)	(0.022)	(0.051)	(0.059)	(0.065)	(0.087)
NPL (-1)		-0.154***	-0.055**	-0.097**	-0.097*	-0.132*		-0.032**	-0.043*	-0.080**	-0.065*	-0.197**
		(0.059)	(0.024)	(0.045)	(0.056)	(0.068)		(0.014)	(0.024)	(0.040)	(0.039)	(0.095)
CAR (-1)			-0.185**	-0.184**	-0.213***	-0.216*			-0.211**	-0.081	-0.141*	-0.123
			(0.085)	(0.090)	(0.075)	(0.115)			(0.097)	(0.050)	(0.075)	(0.096)
INTR (-1)				-0.002	-0.008	-0.280**				-0.013	-0.054	-0.186**
				(0.028)	(0.040)	(0.132)				(0.025)	(0.047)	(0.082)
INFL (-1)					-0.042	-0.259**					-0.155**	-0.234**
					(0.050)	(0.112)					(0.072)	(0.098)
GDP (-1)						-0.195**						-0.228***
						(0.079)						(0.075)
CRISIS	-0.222*	-0.481**	-0.497*	-0.641**	-0.593**	-0.228	-0.022	-0.067	-0.558*	-0.458**	0.354	0.572
	(0.121)	(0.232)	(0.287)	(0.263)	(0.292)	(0.333)	(0.110)	(0.152)	(0.333)	(0.208)	(0.329)	(0.472)
Observations	587	594	541	593	593	613	565	536	557	590	527	528
Countries	89	89	89	89	89	89	89	89	89	89	89	89
Inst/Cross Sec.	0.48	0.22	0.28	0.22	0.29	0.25	0.50	0.51	0.30	0.24	0.28	0.28
J-statistic	47.91	21.94	25.54	19.37	23.27	17.54	50.93	51.10	29.87	22.23	23.73	17.87
p-value	(0.16)	(0.11)	(0.14)	(0.11)	(0.18)	(0.23)	(0.14)	(0.11)	(0.12)	(0.10)	(0.13)	(0.33)
AR (1)	-0.47	-0.48	-0.40	-0.46	-0.45	-0.47	-0.44	-0.44	-0.40	-0.48	-0.42	-0.45
p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
AR (2)	0.02	0.00	-0.00	0.00	-0.00	0.00	-0.04	-0.04	-0.04	-0.00	-0.03	0.03
p-value	(0.73)	(0.96)	(0.96)	(0.92)	(0.96)	(0.93)	(0.47)	(0.42)	(0.40)	(0.99)	(0.59)	(0.54)

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. GMM – uses two-step of Arellano and Bover (1995) without time period effects. GMM estimator – tests for AR (1) and AR (2) check for the presence of first and second-order serial correlation in the first-difference residuals. The sample is an unbalanced panel with annual data of 89 countries (61 developing countries and 28 developed countries, see table A1 in the appendix) from 2006 to 2015. Control variables: bank nonperforming loans to total loans (NPL); bank regulatory capital to risk-weighted assets (CAR); real interest rate (INTR); inflation index (INFL); growth rate (GDP). Description of each variable associated with their respective source is detailed in Table A2 in the appendix.

Table 4 - Financial development (FI) and Banking Framework
Regression results of the model - Developing Countries

	Banking Concentration (BANK_5)						**Banking Concentration (BANK_3)**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
FI (-1)	0.804***	0.814***	0.843***	0.869***	0.858***	0.842***	0.856***	0.815***	0.864***	0.875***	0.876***	0.890***
	(0.023)	(0.023)	(0.036)	(0.033)	(0.027)	(0.027)	(0.022)	(0.033)	(0.021)	(0.025)	(0.026)	(0.032)
BANK_5(-1)	-0.046**	-0.049**	-0.055*	-0.060***	-0.074***	-0.077***						
	(0.022)	(0.025)	(0.033)	(0.023)	(0.020)	(0.022)						
BANK_3(-1)							-0.033***	-0.051*	-0.024**	-0.027*	-0.036**	-0.060***
							(0.007)	(0.029)	(0.011)	(0.015)	(0.014)	(0.020)
NPL (-1)		-0.058**	-0.107***	-0.062***	-0.055**	-0.070***		-0.053*	-0.057***	-0.083***	-0.080***	-0.101***
		(0.024)	(0.040)	(0.023)	(0.023)	(0.023)		(0.031)	(0.018)	(0.018)	(0.017)	(0.023)
CAR (-1)			-0.210	-0.230**	-0.199**	-0.187***			-0.152***	-0.228***	-0.238***	-0.313***
			(0.129)	(0.092)	(0.081)	(0.059)			(0.042)	(0.062)	(0.061)	(0.082)
INTR (-1)				-0.002	-0.008	-0.024				-0.020	-0.016	-0.044**
				(0.015)	(0.016)	(0.021)				(0.018)	(0.018)	(0.022)
INFL (-1)					-0.016	-0.017					-0.002	-0.032
					(0.027)	(0.021)					(0.033)	(0.035)
GDP (-1)						-0.028						-0.078**
						(0.032)						(0.038)
CRISIS	-0.245**	-0.276**	-0.499**	-0.326*	-0.323*	-0.401*	-0.323**	-0.410**	-0.338***	-0.509***	-0.489***	-0.158
	(0.114)	(0.130)	(0.195)	(0.190)	(0.173)	(0.227)	(0.138)	(0.177)	(0.120)	(0.156)	(0.178)	(0.286)
Observations	424	422	424	358	356	356	319	436	369	361	361	361
Countries	61	61	61	61	61	61	61	61	61	61	61	61
Inst/Cross Sec.	0.62	0.62	0.62	0.66	0.66	0.69	0.68	0.39	0.68	0.68	0.66	0.64
J-statistic	39.03	39.63	35.79	32.03	33.16	34.34	44.06	25.03	43.28	36.02	35.52	35.38
p-value	(0.29)	(0.23)	(0.34)	(0.51)	(0.41)	(0.40)	(0.23)	(0.20)	(0.16)	(0.37)	(0.31)	(0.23)
AR (1)	-0.44	-0.46	-0.43	-0.40	-0.42	-0.42	-0.44	-0.49	-0.43	-0.43	-0.43	-0.42
p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
AR (2)	0.33	0.04	0.00	-0.03	-0.03	-0.01	-0.05	-0.00	-0.06	-0.05	-0.05	-0.02
p-value	(0.53)	(0.47)	(0.99)	(0.58)	(0.64)	(0.87)	(0.57)	(0.97)	(0.32)	(0.45)	(0.45)	(0.76)

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. GMM – uses two-step of Arellano and Bover(1995) without time period effects. GMM estimator – tests for AR (1) and AR (2) check for the presence of first- and second-order serial correlation in the first-difference residuals. The sample is an unbalanced panel with annual data of 61developing countries (see table A1 in the appendix) from 2006 to 2015.Control variables: bank nonperforming loans to total loans (NPL); bank regulatory capital to risk-weighted assets (CAR); real interest rate (INTR); inflation index (INFL); growth rate (GDP). Description of each variable associated with their respective source is detailed in Table A2 in the appendix

3.2. Financial Development (FI) and Banking Competition

In this section we analyze the effect of banking competition (Lerner and Boone indexes) on financial development (FI). Table 5 reports the full sample results, where all countries are analyzed altogether, while Table 6 reports the results for the sample of developing countries.

In general, the coefficients of the Lerner index have negative signs and statistical significance. Concerning the Boone index, the estimations involving developing countries show the expected sign and statistical significance. The negative relationship between the degree of competition and financial development indicates that an economic environment of higher competitiveness leads to a higher financial development. Thus, there is evidence that financial development can be fostered if greater incentives for competitiveness are provided.

In most of the estimations, the NPL negative signs and statistical significance evidence that an increase in credit risk constrains financial development. It is also noteworthy that the negative sign and statistical significance of the CAR variable in the developing countries' analysis strengthens the existence of a trade-off between capital regulation and financial development. At last, the crisis dummy results corroborate the effect of crises' periods in financial development. These results corroborate the findings in the banking concentration analysis.

3.3. Credit, Concentration and Banking Competition

The results obtained in the previous subsections indicate that banking framework can constrain financial development. An increase in the banking market power derived from high concentration or low competition can harm financial development. Therefore, to corroborate these findings, Tables 7 to 10 present the estimates for the domestic credit

provided by the financial sector as a percentage of GDP (CRED_GDP), a long-established measure in the literature (Levine, 2003).

In particular, Tables 7 and 8 report the effect of banking concentration (Bank_5, Bank_3) on the CRED_GDP for the full sample and for the developing countries, respectively. The same goes for Tables 9 and 10, which report the effect of banking competition (Lerner, Boone indexes) on the CRED_GDP.

Table 5 - Financial development (FI) and Banking Framework
Regression results of the model - All Countries

	Banking Competition (LERNER Index)						**Banking Competition (BOONE Index)**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
FI (-1)	0.864***	0.889***	0.808***	0.842***	0.878***	0.828***	0.785***	0.799***	0.821***	0.842***	0.678***	0.911***
	(0.025)	(0.062)	(0.0314)	(0.026)	(0.032)	(0.034)	(0.059)	(0.067)	(0.093)	(0.110)	(0.230	(0.089)
LERNER (-1)	-0.060***	-0.049*	-0.046***	-0.044***	-0.068***	-0.053***						
	(0.015)	(0.026)	(0.014)	(0.013)	(0.017)	(0.019)						
BOONE (-1)							-0.163	-0.012	-0.007	-0.013	-0.046	-0.014
							(0.539)	(0.008)	(0.014)	(0.014)	(0.050)	(0.014)
NPL (-1)		-0.121**	-0.081***	-0.061**	-0.064***	-0.076**		-0.063***	-0.058*	-0.066*	-0.145*	-0.069*
		(0.050)	(0.028)	(0.031)	(0.021)	(0.032)		(0.023)	(0.031)	(0.039)	(0.083)	(0.040)
CAR (-1)			-0.056*	-0.035	-0.057	-0.113			-0.078	-0.047	-0.033	-0.008
			(0.033)	(0.043)	(0.061)	(0.069)			(0.072	(0.132)	(0.130)	(0.140)
INTR (-1)				-0.013	-0.014	-0.059				-0.020	-0.120	-0.127
				(0.018)	(0.028)	(0.043)				(0.042)	(0.127)	(0.095)
INFL (-1)					-0.071**	-0.107***					-0.025	-0.032
					(0.035)	(0.038)					(0.091)	(0.058)
GDP (-1)						-0.011						-0.093
						(0.038)						(0.066)
CRISIS	-0.428***	-0.490**	-0.845***	-0.561***	-0.616***	-0.627***	-0.277*	-0.565**	-0.537*	-0.518*	-1.031	-0.191
	(0.113)	(0.242)	(0.176)	(0.190)	(0.203)	(0.229)	(0.166)	(0.251)	(0.292)	(0.310)	(1.216)	(0.418)
Observations	516	540	522	539	472	552	506	506	510	520	504	504
Countries	89	89	89	89	89	89	89	89	89	89	89	89
Inst/Cross Sec.	0.45	0.23	0.50	0.48	0.48	0.45	0.29	0.20	0.17	0.16	0.10	0.26
J-statistic	46.30	22.17	46.39	44.02	37.16	40.08	30.13	17.87	13.86	13.29	1.02	19.77
p-value	(0.12)	(0.10)	(0.14)	(0.12)	(0.28)	(0.10)	(0.12)	(0.16)	(0.18)	(0.10)	(0.60)	(0.14)
AR (1)	-0.48	-0.48	-0.46	-0.46	-0.42	-0.44	-0.43	-0.43	-0.42	-0.43	-0.39	-0.46
p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
AR (2)	-0.01	0.02	0.01	0.02	-0.05	-0.02	-0.05	-0.07	-0.06	-0.08	-0.09	-0.02
p-value	(0.81)	(0.61)	(0.83)	(0.62)	(0.39)	(0.61)	(0.38)	(0.24)	(0.26)	(0.17)	(0.12)	(0.68)

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. GMM – uses two-step of Arellano and Bover (1995) without time period effects. GMM estimator – tests for AR (1) and AR (2) check for the presence of first- and second-order serial correlation in the first-difference residuals. The sample is an unbalanced panel with annual data of 89 countries (61 developing countries and 28 developed countries, see table A1 in the appendix) from 2006 to 2015. Control variables: bank nonperforming loans to total loans (NPL); bank regulatory capital to risk-weighted assets (CAR); real interest rate (INTR); inflation index (INFL); growth rate (GDP). Description of each variable associated with their respective source is detailed in Table A2 in the appendix.

Table 6 - Financial development (FI) and Banking Framework
Regression results of the model - Developing Countries

	Banking Competition (LERNER Index)						**Banking Competition (BOONE Index)**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
FI (-1)	0.909***	0.870***	0.889***	0.892***	0.898***	0.904***	0.880***	0.842***	0.903***	0.898***	0.870***	0.915***
	(0.014)	(0.021)	(0.029)	(0.034)	(0.029)	(0.034)	(0.038)	(0.058)	(0.037)	(0.068)	(0.057)	(0.055)
LERNER (-1)	-0.029***	-0.039***	-0.040**	-0.042***	-0.038**	-0.040**						
	(0.011)	(0.013	(0.016)	(0.016)	(0.016)	(0.018)						
BOONE (-1)							-0.016	-0.012*	-0.011**	-0.026**	-0.016*	-0.013*
							(0.010)	(0.007)	(0.005)	(0.011)	(0.009)	(0.008)
NPL (-1)		-0.063***	-0.079***	-0.085***	-0.088***	-0.086***		-0.078***	-0.080***	-0.120**	-0.083**	-0.065*
		(0.019)	(0.027)	(0.026)	(0.025)	(0.028)		(0.025)	(0.017)	(0.055)	(0.036)	(0.037)
CAR (-1)			-0.355***	-0.401***	-0.368***	-0.381***			-0.092**	-0.041	-0.128*	-0.150*
			(0.125)	(0.092)	(0.090)	(0.111)			(0.035)	(0.096)	(0.077)	(0.087)
INTR (-1)				-0.003	-0.005	-0.010				-0.051*	-0.024	-0.016
				(0.017)	(0.016)	(0.026)				(0.031)	(0.028)	(0.021)
INFL (-1)					-0.024	-0.024					-0.026	-0.022
					(0.030)	(0.036)					(0.035)	(0.040)
GDP (-1)						-0.004						-0.041
						(0.030)						(0.029)
CRISIS	-0.218*	-0.464***	-0.665***	-0.554**	-0.463**	-0.456*	-0.416*	-0.564*	-0.327*	-0.749*	-0.604**	-0.593*
	(0.122)	(0.150)	(0.190)	(0.276)	(0.234)	(0.246)	(0.244)	(0.326)	(0.181)	(0.440)	(0.280)	(0.356)
Observations	329	328	328	334	329	329	312	358	357	308	350	306
Countries	61	61	61	61	61	61	61	61	61	61	61	61
Inst/Cross Sec.	0.70	0.70	0.70	0.71	0.70	0.70	0.47	0.27	0.51	0.27	0.40	0.48
J-statistic	39.40	39.08	34.17	28.03	32.71	32.70	31.77	14.90	30.51	12.72	20.03	24.59
p-value	(0.32)	(0.29)	(0.46)	(0.75)	(0.43)	(0.38)	(0.13)	(0.25)	(0.21)	(0.24)	(0.22)	(0.22)
AR (1)	-0.41	-0.43	-0.37	-0.36	-0.37	-0.37	-0.41	-0.42	-0.42	-0.43	-0.41	-0.40
p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
AR (2)	-0.05	-0.04	-0.06	-0.06	-0.06	-0.06	-0.08	-0.11	-0.10	-0.08	-0.10	-0.13
p-value	(0.46)	(0.59)	(0.40)	(0.37)	(0.34)	(0.36)	(0.32)	(0.10)	(0.11)	(0.34)	(0.12)	(0.15)

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. GMM – uses two-step of Arellano and Bover(1995) without time period effects. GMM estimator – tests for AR (1) and AR (2) check for the presence of first and second-order serial correlation in the first-difference residuals. The sample is an unbalanced panel with annual data of 61developing countries (see table A1 in the appendix) from 2006 to 2015. Control variables: bank nonperforming loans to total loans (NPL); bank regulatory capital to risk-weighted assets (CAR); real interest rate (INTR); inflation index (INFL); growth rate (GDP). Description of each variable associated with their respective source is detailed in Table A2 in the appendix.

The statistical significance and negative signs of banking concentration and competition coefficients (Tables 7 to 10) indicate that high banking concentration, as well as low banking competition, reduces the availability of credit in the countries' financial systems, measured by the CRED_GDP. These results suggest that an increase in banking market power can lead the financial systems to credit rationing, shedding light on the credit market behavior under a banking framework perspective.

Regarding the banking variables, the NPL stands out both in the full sample and in the developing countries analysis. There is evidence that an increase in the NPL deprives the amount of credit in the countries. With respect to CAR, which is a proxy for financial stability, the results emphasize the trade-off with financial development, proxied by the CRED_GDP.

The conclusions concerning the effects of the macroeconomic variables on financial development (CRED_GDP) corroborate the conclusions previously obtained for FI. In this sense, the results indicate that increments of the interest rate may hinder financial development. The behavior of real interest rates is, to some extent, a reflection of monetary policy, which may affect the amount of credit in the economy. The coefficients of the variable INFL (inflation) also confirm the preceding results, suggesting that uncertainties generated by high inflation rates affecst/impairs financial development.

It is expected a positive relationship between GDP growth and credit-to-GDP ratio. However, the negative effect of GDP on CRED_GDP, though not expected, can be explained by the reasoning that underpins the CRED_GDP. Therefore, an increase (reduction) in the GDP growth can lead to a reduction (increase) in the credit-to-GDP ratio. The CRISIS dummy, which captures the effects of the financial crisis in the period 2008/2009, holds the negative signs and statistical significance in most of the models, suggesting that financial development deteriorates during subprime crisis .

Thus, the estimates for banking concentration and banking competition in relation to the credit-to-GDP ratio (CRED_GDP) for the full sample, as well as for the developing countries, corroborate the results obtained in the main analysis involving financial development (FI). In short, banking market power is an issue, and improvement in

banking framework (a decrease in concentration or an increase in competition) is relevant to financial development.

Table 7 - Credit (CRED_GDP) and Banking Framework
Regression results of the model - All Countries

	Banking Concentration (BANK_5)						**Banking Concentration (BANK_3)**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
CRED_GDP (-1)	0.351**	0.795***	0.852***	0.809***	0.712***	0.786***	0.748***	0.764***	0.715***	0.708***	0.732***	0.774***
	(0.155)	(0.092)	(0.074)	(0.047)	(0.065)	(0.054)	(0.101)	(0.077)	(0.075)	(0.079)	(0.109)	(0.049)
BANK_5(-1)	-0.192*	-0.068	-0.337*	-0.274**	-0.329*	-0.286*						
	(0.112)	(0.134)	(0.201)	(0.128)	(0.182)	(0.155)						
BANK_3(-1)							-0.923***	-0.380*	-0.452*	-0.468**	-0.072	-0.450***
							(0.294)	(0.205)	(0.234)	(0.236)	(0.280)	(0.172)
NPL (-1)		-0.736***	-0.667***	-0.684***	-0.629***	-0.757***		-0.521***	-0.506***	-0.692***	-0.689***	-0.588***
		(0.173)	(0.156)	(0.093)	(0.097)	(0.128)		(0.138)	(0.099)	(0.122)	(0.131)	(0.089)
CAR (-1)			-0.401*	-0.400**	-0.640**	-0.412**			-0.448**	-0.430	-0.298	-0.829***
			(0.207)	(0.157)	(0.259)	(0.189)			(0.215)	(0.289)	(0.512)	(0.241)
INTR (-1)				-0.015	-0.031	-0.225**				0.048	-0.108	-0.107*
				(0.063)	(0.076)	(0.108)				(0.108)	(0.0914)	(0.065)
INFL (-1)					-0.128	-0.343*					-0.012	-0.354**
					(0.257)	(0.181)					(0.250)	(0.171)
GDP (-1)						-0.193*						-0.310**
						(0.113)						(0.125)
CRISIS	-0.645	-0.142	-0.400	-0.372	-0.331	1.651	1.017	1.206	-0.416	-1.750	-0.367	2.623**
	(2.123)	(1.391)	(1.211)	(1.278)	(1.848)	(1.475)	(1.341)	(1.039)	(1.227)	(1.289)	(1.987)	1.184
Observations	469	548	506	418	422	403	528	449	507	512	489	423
Countries	89	89	89	89	89	89	89	89	89	89	89	89
Inst/Cross Sec.	0.11	0.19	0.31	0.37	0.30	0.39	0.30	0.26	0.33	0.31	0.31	0.49
J-statistic	8.15	14.69	18.04	22.76	22.30	22.10	25.38	17.91	20.92	27.03	16.73	31.06
p-value	(0.32)	(0.33)	(0.70)	(0.53)	(0.22)	(0.51)	(0.33)	(0.46)	(0.59)	(0.13)	(0.61)	(0.51)
AR (1)	-0.27	-0.43	-0.45	-0.39	-0.39	-0.42	-0.38	-0.39	-0.39	-0.39	-0.37	-0.40
p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
AR (2)	-0.05	-0.07	-0.01	-0.04	-0.05	-0.03	-0.04	-0.05	-0.06	-0.05	-0.07	-0.09
p-value	(0.50)	(0.19)	(0.82)	(0.59)	(0.45)	(0.69)	(0.44)	(0.44)	(0.26)	(0.32)	(0.19)	(0.20)

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. GMM – uses two-step of Arellano and Bover (1995) without time period effects. GMM estimator – tests for AR (1) and AR (2) check for the presence of first order and second-order serial correlation in the first-difference residuals. The sample is an unbalanced panel with annual data of 89 countries (61 developing countries and 28 developed countries, see table A1 in the appendix) from 2006 to 2015. Control variables: bank nonperforming loans to total loans (NPL); bank regulatory capital to risk-weighted assets (CAR); real interest rate (INTR); inflation index (INFL); growth rate GDP (GDP). Description of each variable associated with their respective source is detailed in table A2 in the appendix.

Table 8 - Credit (CRED_GDP) and Banking Framework
Regression results of the model - Developing Countries

	Banking Concentration (BANK_5)						**Banking Concentration (BANK_3)**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
CRED_GDP (-1)	0.902***	0.922***	0.924***	0.940***	0.916***	0.921***	0.793***	0.939***	0.880***	0.989***	0.982***	0.966***
	(0.044)	(0.017)	(0.017)	(0.027)	(0.028)	(0.057)	(0.057)	(0.029)	(0.030)	(0.035)	(0.055)	(0.055)
BANK_5(-1)	-0.099**	-0.048**	-0.063**	-0.087**	-0.099***	-0.488***						
	(0.050)	(0.023)	(0.026)	(0.036)	(0.030)	(0.051)						
BANK_3(-1)							-0.424***	-0.130***	-0.252***	-0.211***	-0.194***	-0.204***
							(0.138)	(0.037)	(0.028)	(0.029)	(0.054)	(0.055)
NPL (-1)		-0.676***	-0.643***	-0.711	-0.681***	-0.666**		-0.915***	-0.616***	-0.905***	-0.752***	-0.709***
		(0.035)	(0.0378)	(0.060)	(0.044)	(0.295)		(0.057)	(0.057)	(0.077)	(0.187)	(0.211)
CAR (-1)			-0.146*	-0.234*	-0.156*	-1.108***			-0.266***	-0.377***	-0.966***	-0.951***
			(0.088)	(0.132)	(0.082)	(0.267)			(0.078)	(0.086)	(0.211)	(0.243)
INTR (-1)				-0.132***	-0.100***	-0.209***				-0.054**	-0.078**	-0.132***
				(0.021)	(0.020)	(0.059)				(0.023)	(0.036)	(0.047)
INFL (-1)					-0.086*	-0.006					-0.038	-0.073
					(0.045)	(0.107)					(0.103)	(0.101)
GDP (-1)						-0.225**						-0.152*
						(0.088)						(0.087)
CRISIS	-0.377	-0.972***	-1.046***	-0.823*	-0.124	-0.411	-0.135	-0.995***	-0.700*	-0.929**	-0.573	-0.164
	(0.980)	(0.280)	(0.328)	(0.494)	(0.505)	(0.865)	(0.917)	(0.290)	(0.379)	(0.449)	(0.656)	(0.737)
Observations	344	359	359	343	342	409	365	377	362	356	417	417
Countries	61	61	61	61	61	61	61	61	61	61	61	61
Inst/Cross Sec.	0.36	0.68	0.68	0.69	0.72	0.61	0.43	0.68	0.68	0.71	0.61	0.61
J-statistic	25.57	38.65	36.99	37.26	40.40	29.37	24.03	37.93	41.09	39.41	29.97	29.64
p-value	(0.11)	(0.40)	(0.42)	(0.32)	(0.21)	(0.39)	(0.40)	(0.38)	(0.25)	(0.32)	(0.42)	(0.38)
AR (1)	-0.42	-0.42	-0.43	-0.38	-0.40	-0.42	-0.42	-0.43	-0.43	-0.40	-0.47	-0.46
p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
AR (2)	-0.03	-0.05	-0.05	-0.09	-0.07	-0.04	-0.02	-0.03	-0.03	-0.06	0.00	-0.01
p-value	(0.55)	(0.31)	(0.33)	(0.11)	(0.24)	(0.44)	(0.66)	(0.49)	(0.51)	(0.25)	(0.99)	(0.87)

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. GMM – uses two-step of Arellano and Bover(1995) without time period effects. GMM estimator – tests for AR (1) and AR (2) check for the presence of first order and second-order serial correlation in the first-difference residuals. The sample is an unbalanced panel with annual data of 61developing countries (see table A1 in the appendix) from 2006 to 2015. Control variables: bank nonperforming loans to total loans (NPL); bank regulatory capital to risk-weighted assets (CAR); real interest rate (INTR); inflation index (INFL); growth rate (GDP). Description of each variable associated with their respective source is detailed in table A2 in the appendix.

Table 9 - Credit (CRED_GDP) and Banking Framework
Regression results of the model - All Countries

	Banking Competition (LERNER Index)						**Banking Competition (BOONE Index)**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
CRED_GDP (-1)	0.697***	0.690***	0.801***	0.817***	0.689***	0.706***	0.730***	1.122***	0.818***	0.901***	0.809***	0.907***
	(0.053)	(0.045)	(0.052)	(0.096)	(0.044)	(0.036)	(0.043)	(0.072)	(0.044)	(0.044)	(0.120)	(0.045)
LERNER (-1)	-0.137***	-0.057*	-0.078*	-0.174**	-0.137***	-0.125***						
	(0.040)	(0.034)	(0.043)	(0.085)	(0.041)	(0.040)						
BOONE (-1)							-0.014	-0.098**	-0.047**	-0.054**	-0.105	-0.075***
							(0.035)	(0.047)	(0.020)	(0.023)	(0.130)	(0.027)
NPL (-1)		-0.410***	-0.671***	-0.874***	-0.560***	-0.642***		-0.492***	-0.526***	-0.585***	-0.968***	-0.740***
		(0.050)	(0.122)	(0.191)	(0.086)	(0.076)		(0.066)	(0.130)	(0.070)	(0.190)	(0.138)
CAR (-1)			-0.254**	-0.314	-0.269**	-0.236**			-1.239***	-0.597***	-0.038	-0.568***
			(0.103)	(0.228)	(0.142)	(0.100)			(0.306)	(0.188)	(0.426)	(0.168)
INTR (-1)				-0.163*	-0.109*	-0.090*				-0.027	-0.420**	-0.204*
				(0.088)	(0.059)	(0.054)				(0.065)	(0.193)	(0.111)
INFL (-1)					-0.222***	-0.165**					-0.038	-0.517**
					(0.082)	(0.076)					(0.266)	(0.225)
GDP (-1)						-0.143*						-0.173*
						(0.080)						(0.104)
CRISIS	-1.307*	-1.491**	-1.628*	-2.581	-0.530	-1.232	1.795*	2.979***	-0.059	1.967**	-0.754	3.975***
	(0.710)	(0.724)	(0.941)	(1.616)	(0.939)	(1.020)	(0.968)	(0.928)	(0.943)	(0.779)	(1.895)	(1.311)
Observations	440	440	435	445	361	357	429	516	419	418	492	425
Countries	89	89	89	89	89	89	89	89	89	89	89	89
Inst/Cross Sec.	0.49	0.52	0.50	0.31	0.53	0.58	0.30	0.45	0.48	0.49	0.25	0.49
J-statistic	45.27	37.68	38.10	22.50	39.46	42.23	29.47	41.58	33.09	29.96	13.82	32.39
p-value	(0.17)	(0.53)	(0.37)	(0.31)	(0.24)	(0.26)	(0.13)	(0.21)	(0.51)	(0.67)	(0.46)	(0.45)
AR (1)	-0.41	-0.44	-0.46	-0.44	-0.46	-0.45	-0.38	-0.50	-039	-0.43	-0.38	-0.43
p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
AR (2)	-0.02	0.01	0.02	-0.02	0.07	0.07	-0.05	0.06	-0.02	0.03	-0.08	-0.04
p-value	(0.74)	(0.93)	(0.81)	(0.79)	(0.35)	(0.36)	(0.41)	(0.29)	(0.81)	(0.60)	(0.15)	(0.50)

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. GMM – uses two-step of Arellano and Bover (1995) without time period effects. GMM estimator – tests for AR (1) and AR (2) check for the presence of first order and second-order serial correlation in the first-difference residuals. The sample is an unbalanced panel with annual data of 89 countries (61 developing countries and 28 developed countries, see table A1 in the appendix) from 2006 to 2015. Control variables: bank nonperforming loans to total loans (NPL); bank regulatory capital to risk-weighted assets (CAR); real interest rate (INTR); inflation index (INFL); growth rate (GDP). Description of each variable associated with their respective source is detailed in table A2 in the appendix

Table 10 - Credit (CRED_GDP) and Banking Framework
Regression results of the model - Developing Countries

	Banking Competition (LERNER Index)						**Banking Competition (BOONE Index)**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
CRED_GDP (-1)	0.758***	0.994***	0.834***	0.900***	0.948***	0.919***	0.758***	0.966***	0.976***	1.003***	0.991***	0.990***
	(0.012)	(0.035)	(0.028)	(0.047)	(0.023)	(0.029)	(0.055)	(0.022)	(0.023)	(0.025)	(0.040)	(0.041)
LERNER (-1)	-0.037***	-0.043*	-0.064***	-0.077***	-0.054**	-0.055**						
	(0.012)	(0.022)	(0.023)	(0.026)	(0.024)	(0.025)						
BOONE (-1)							0.120***	-0.015*	-0.004	-0.012*	-0.006	-0.010
							(0.023)	(0.009)	(0.006)	(0.006)	(0.023)	(0.029)
NPL (-1)		-0.908***	-0.576***	-0.765***	-0.732***	-0.709***		-0.906***	-0.933***	-0.918***	-0.880***	-0.901***
		(0.096)	(0.071)	(0.109)	(0.055)	(0.078)		(0.075)	(0.067)	(0.073)	(0.157)	(0.159)
CAR (-1)			-0.243***	-0.316**	-0.572***	-0.664***			-0.375***	-0.357***	-0.953***	-0.929***
			(0.088)	(0.146)	(0.137)	(0.166)			(0.118)	(0.115)	(0.237)	(0.253)
INTR (-1)				-0.081***	-0.136***	-0.085*				-0.106***	-0.094**	-0.088*
				(0.028)	(0.028)	(0.049)				(0.023)	(0.040)	(0.045)
INFL (-1)					-0.121**	-0.150*					-0.040	-0.040
					(0.058)	(0.077)					(0.115)	(0.116)
GDP (-1)						0.135						0.026
						(0.095)						(0.103)
CRISIS	-0.316**	-1.362***	-1.435***	-1.349**	-0.923**	-1.087*	-0.633*	-0.914**	-1.318***	-1.406***	-1.227**	-1.173**
	(0.157)	(0.347)	(0.410)	(0.624)	(0.453)	(0.584)	(0.355)	(0.450)	(0.305)	(0.367)	(0.582)	(0.584)
Observations	321	396	328	329	316	316	359	384	363	367	417	417
Countries	61	61	61	61	61	61	61	61	61	61	61	61
Inst/Cross Sec.	0.76	0.62	0.70	0.68	0.76	0.78	0.41	0.64	0.71	0.69	0.61	0.61
J-statistic	40.59	33.76	39.22	30.66	37.78	36.18	26.56	36.10	38.51	37.75	31.73	31.31
p-value	(0.40)	(0.38)	(0.29)	(0.53)	(0.30)	(0.37)	(0.23)	(0.42)	(0.40)	(0.34)	(0.33)	(0.30)
AR (1)	-0.41	-0.52	-0.44	-0.41	-0.39	-0.40	-0.41	-0.43	-0.42	-0.40	-0.45	-0.46
p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
AR (2)	-0.06	0.01	-0.06	-0.08	-0.10	-0.09	-0.04	-0.04	-0.06	-0.07	-0.03	-0.02
p-value	(0.30)	(0.84)	(0.34)	(0.21)	(0.10)	0.13	(0.49)	(0.44)	(0.28)	(0.19)	(0.61)	(0.67)

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. GMM – uses two-step of Arellano and Bover(1995) without time period effects. GMM estimator – tests for AR (1) and AR (2) check for the presence of first order and second-order serial correlation in the first-difference residuals. The sample is an unbalanced panel with annual data of 61developing countries (see table A1 in the appendix) from 2006 to 2015. Control variables: bank nonperforming loans to total loans (NPL); bank regulatory capital to risk-weighted assets (CAR); real interest rate (INTR); inflation index (INFL); growth rate. Description of each variable associated with their respective source is detailed in table A2 in the appendix

4. Robustness Checks

This section checks the effect of bank concentration measured by the Herfindahl index (HHI) on financial development (FI) and Credit (CRED_GDP). For that, we used another sample. Data were collected from the European Central Bank - Statistical Data Warehouse. Due to limited data availability, only 23 countries were used from 2006 to 2015.[2] Descriptive statistics are reported in Table 11.

Table 11 - Summary Statistics

	Obs.	Mean	Median	Máximum	Minimum	Standard dev.
Financial development						
FI	230	0.691	0.691	0.942	0.379	0.137
CRED_GDP	228	121.413	111.347	316.983	23.880	64.279
Bank Concentration (HHI)	223	0.112	0.103	0.834	0.0178	0.078
Control variables						
NPL	222	8.027	5.210	47.750	0.200	7.634
CAR	228	14.879	14.385	35.650	7.340	3.606
INTR	221	5.112	4.619	28.791	-7.690	3.759
INFL	230	2.360	2.143	15.431	-4.780	2.447
GDP	230	1.554	1.761	25.557	-14.814	4.353

Control variables : bank nonperforming loans to total loans (NPL); bank regulatory capital to risk-weighted assets (CAR); real interest rate (INTR); inflation as measured by the consumer price index (INFL); annual percentage growth rate of GDP market prices (GDP). Description of each variable associated with their respective source is detailed in table A2 in the appendix.

Estimations also used the dynamic panel data method (GMM), and the econometric model presents specification similar to model 1:

[2] Austria, France, Lithuania, Slovenia, Belgium, Germany, Malta, Spain, Bulgaria, Greece, Netherlands, Croatia, Hungary, Poland, Cyprus, Ireland, Portugal, Czech Republic, Italy, Romania, Estonia, Latvia and Slovak Republic.

$$\boldsymbol{Financial\ development_{i,t} = \beta_0 + Financial\ development_{i,t-1} + HHI_{i,t-1} + Controls_{i,t-1} + Crisis_{i,t} + \varepsilon_{i,t}} \quad . \quad (2)$$

Table 12 shows the regression regarding the effect of HHI on financial development. The results corroborate those found previously with the bank concentration Bank_5 and Bank_3. Therefore, an increase in bank concentration measured by HHI can inhibit financial development (FI) and credit (Credit_GDP). The variables NPL and CAR stand out in the analysis. They reinforce the idea that an increase in defaults undermines countries' credit supply. Besides, the trade-off between CAR and credit remains.

Table 12 - Estimates of the Financial development (FI) and Credit (CRED_GDP) on Banking Framework (HHI)
Regression results of the model

	Financial development (FI)						**Credit (CRED_GDP)**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
FI(-1)	0.798***	0.671***	0.315***	0.293***	0.339**	0.389**						
	(0.075)	(0.054)	(0.079)	(0.110)	(0.146)	(0.192)						
CRED_GDP(-1)							0.653***	0.992***	0.724***	0.739***	0.782***	0.832***
							(0.028)	(0.067)	(0.056)	(0.050)	(0.072)	(0.045)
Bank Concentration(HHI)	-0.130*	-0.094*	-0.127*	-0.148*	-0.130*	-0.174**	1.519***	-0.228**	-0.522*	-0.613***	-0.481*	-0.541**
	(0.072)	(0.055)	(0.075)	(0.080)	(0.073)	(0.085)	(0.449)	(0.096)	(0.314)	(0.205)	(0.245)	(0.257)
NPL(-1)		-0.227***	-0.123***	-0.087**	-0.086*	-0.113**		-1.202***	-0.655***	-0.560***	-0.621***	-0.583***
		(0.024)	(0.030)	(0.036)	(0.043)	(0.044)		(0.190)	(0.124)	(0.090)	(0.091)	(0.123)
CAR(-1)			-0.145**	-0.233***	-0.301**	-0.054			-1.644***	-1.722***	-1.645***	-1.665***
			(0.066)	(0.081)	(0.126)	(0.158)			(0.570)	(0.281)	(0.495)	(0.525)
INTR(-1)				-0.028	-0.012	-0.169				0.548	0.786**	0.248
				(0.075)	(0.055)	(0.131)				(0.347)	(0.344)	(0.268)
INFL(-1)					-0.208***	-0.161**					-0.293	-0.516
					(0.077)	(0.075)					(0.406)	(0.521)
GDP(-1)						-0.230***						-0.214
						(0.066)						(0.191)
CRISIS	1.825***	-0.237	-0.184	-0.001	0.510	1.270**	0.774	1.856	0.215	-1.175	-0.191	0.865
	(0.323)	(0.298)	(0.295)	(0.356)	(0.411)	(0.508)	(1.511)	(1.697)	(2.320)	(1.839)	(3.416)	(2.717)
Observations	121	169	143	138	137	139	162	114	116	137	137	136
Countries	23	23	23	23	23	23	23	23	23	23	23	23
Inst/Cross Sec.	0.78	0.78	0.78	0.78	0.78	0.78	0.43	0.78	0.74	0.83	0.91	0.91
J-statistic	12.05	14.84	15.18	15.62	13.51	14.38	7.56	10.88	17.97	14.27	13.59	13.73
p-value	(0.68)	(0.39)	(0.30)	(0.21)	(0.26)	(0.16)	(0.37)	(0.67)	(0.12)	(0.35)	(0.51)	(0.39)
AR(1)	-0.41	-0.42	-0.40	-0.40	-0.42	-0.48	-0.43	-0.51	-0.45	-0.49	-0.49	-0.50
p-value	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
AR(2)	0.03	-0.15	-0.02	-0.007	0.006	-0.02	-0.03	-0.14	-0.18	-0.11	-0.12	-0.13
p-value	(0.83)	(0.13)	(0.80)	(0.94)	(0.94)	(0.78)	(0.67)	(0.36)	(0.27)	(0.32)	(0.31)	(0.26)

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. GMM – uses two-step of Arellano and Bover(1995) without time period effects. GMM estimator – tests for AR (1) and AR (2) check for the presence of first order and second-order serial correlation in the first-difference residuals. The sample is an unbalanced panel with annual data of 23 countries (see footnote 1) from 2006 to 2015. Bank concentration: Herfindahl index for Credit institutions total assets (HHI). Control variables: bank nonperforming loans to total loans (NPL); bank regulatory capital to risk-weighted assets (CAR); real interest rate (INTR); inflation index (INFL); growth rate (GDP). Description of each variable associated with their respective source is detailed in table A2 in the appendix

5. Conclusion

This paper analyzes, through a panel with 89 countries from 2006 to 2015, how financial development reacts to banking framework components, namely banking market structure (concentration) and banking market conduct (competition). The main findings suggest that a higher degree of banking concentration or a less competitive banking sector inhibits countries' financial development and credit supply. This is also true for emerging countries. These results suggest that the way the banking sector is structured as well as the conduct banks adopt are important for the provision of financial services in countries with different development levels. Therefore, the results of this study adds a new perspective on banking market power: a financial system concentrated or uncompetitive constrains financial development.

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Appendix

Table A1 - List of countries used in the work

Developing countries			Developed countries
Albania	Kuwait	Uganda	Australia
Algeria	Repub. of Kyrgyzstan	Ukraine	Austria
Argentina	Lebanon	Uruguay	Belgium
Armenia	Macedonia	Venezuela, RB	Canada
Azerbaijan	Malaysia	Zambia	Cyprus
Bahrain	Mauritania		Czech Republic
Bangladesh	Mauritius		Estonia
Belarus	Mexico		France
Bolivia	Moldavia		Germany
Botswana	Mozambique		Greece
Brazil	Nigeria		Hong Kong SAR, China
Bulgaria	Oman		Ireland
Cameroon	Panama		Israel
Chile	Paraguay		Italy
China	Peru		Japan
Colombia	Philippines		Korea, Rep.
Costa Rica	Poland		Lithuania
Croatia	Romania		Latvia
Dominican Republic	Russian Federation		Malta
Ecuador	Rwanda		Netherlands
Egypt, Arab Rep.	Senegal		New Zealand
Georgia	Serbia		Norway
Guatemala	Sierra Leone		Portugal
Honduras	South Africa		Singapore
Hungary	Sri Lanka		Slovak Republic
Indonesia	Tanzania		Slovenia
Jordan	Thailand		Spain
Kenya	Trinidad and Tobago		Switzerland

Table A 2 - Description of the variables and data sources

Variable	Description	Data Source
FI	Financial development index (Sahay, R. *et al.*, 2015). This index was multiplied by 100, without prejudice to the values, only to facilitate the analysis of the results.	*International Monetary Fund*
CRED_GDP	Domestic credit provided by the financial sector (% GDP). It is used as a proxy for financial development measure. Series code FS.AST.DOMS.GD.ZS FS.AST.DOMS.GD.ZS.	*World Bank*
BANK_5	Assets of the five largest banks as a percentage of total assets of commercial banks. This measure is used as a proxy for banking concentration. Series code GFDD.OI.06.	*World Bank*
BANK_3	Assets of the three largest banks as a percentage of the total assets of the commercial banks. This measure is used as a proxy for banking concentration. Series code GFDD.OI.01	*World Bank*
HHI	The Herfindahl index (HI) refers to the concentration of banking business (based on total assets). The HI is obtained by summing the squares of the market shares of all the credit institutions in the banking sector. The exact formula according to which data must be transmitted to the ECB is reported in the ECB Guideline on monetary and financial statistics (recast), (ECB/2014/15).	*European Central Bank - Statistical Data Warehouse*
LERNER	The Lerner index is defined as the difference between price and marginal cost, divided by price. It indicates the effective behavior of the banks by measuring a bank's ability to set its price above the marginal cost and therefore the market power of the bank individually. This index is used as a proxy for bank competition. LERNER's higher values indicate less competition. This index was multiplied by 100, without prejudice to the values. Series code GFDD.OI.04.	*World Bank*
BOONE	This index is a measure of the degree of bank competition, calculated as the elasticity of profits relative to marginal costs. The rationale behind the indicator is that higher profits are achieved by more efficient banks. An increase in the Boone index indicates an inhibition of the competitive conduct of financial intermediaries. This index was multiplied by 100, without prejudice to the values. Only for easy analysis of results. Series code GFDD.OI.05.	*World Bank*
NPL	Bank Nonperforming Loans to Total Loans (%). Loan to arrears ratio (interest and capital payments due 90 days or more) on total gross loans (total value of the loan portfolio). The amount of the loan recorded as a default includes the gross amount of the loan recorded in the balance sheet, not just the amount in arrears. Series code GFDD.SI.02	*World Bank*
CAR	Bank Regulatory Capital to Risk-Weighted Assets (%). It is treated as a solvency indicator of a financial institution. The indicator is calculated by dividing the reference equity by the assets weighted by the risk. Series code GFDD.SI.05.	*World Bank*
INTR	Real interest rate. The real interest rate is the inflation-adjusted interest rate of loans measured by the GDP deflator. Series code FR.INR.RINR.	*World Bank*
GDP	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Series code NY.GDP.MKTP.KD.ZG.	*World Bank*
INFL	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. Series code FP.CPI.TOTL.ZG.	*World Bank*