Bank Concentration and Economic Growth Nexus: Evidence from OIC Countries

BANK CONCENTRATION AND ECONOMIC GROWTH NEXUS: EVIDENCE FROM OIC COUNTRIES

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Abstract

This paper examines the relationship between bank concentration and economic growth in Organization of Islamic Cooperation (OIC) countries. This is done using the system GMM estimators on a panel data sample consisting of 41 countries and 650 observations. Our analysis reveals that bank concentration impacts negatively on economic growth, and this relationship is non-linear. Furthermore, the impact of bank concentration on economic growth is found to be dependent on the country's income but not corruption levels. Nevertheless, different concentration measures provide somehow different results, and thus policymakers should be careful when making policy recommendations. However, it seems reasonable to conclude that bank concentration should be controlled as much as possible to promote economic growth in OIC countries.

Keywords: Bank concentration, financial development, economic growth, OIC countries, corruption, income level.

JEL: O1, O4, L1, P52, C23, D4, F43, G21

1. Introduction

Even though the literature provides conflicting views, a functional banking sector is an important component in the stable financial system. It plays a key role in the economic development of a country and its economic growth. A well-functioning banking sector is especially important for developing countries. However, in the last two decades, the world witnessed the global trend of bank consolidation. This raises the issue of bank concentration and its impact on economic growth to the forefront of academic discussion.

As of now, two major views emerged from the literature. The first view is in favour of a competitive banking structure as it generally leads to efficiency, cheaper credits, and widely available to all (Di Patti & Dell'Ariccia, 2004). On the contrary, the second view supports a robust or monopolistic banking structure. Under this view, bank concentration may stimulate economic growth as these banks are more capable of information collection, screening and monitoring borrowers (Abuzayed & Al-Fayoumi, 2016; Cetorelli & Gambera, 2001; De Guevara & Maudos, 2011; Di Patti & Dell'Ariccia, 2004; Jackson & Thomas, 1995; Petersen & Rajan, 1995).

However, despite overwhelming literature on finance–growth nexus in general and bank concentration–economic growth in particular, this issue has not been adequately addressed within the Organization of Islamic Cooperation (OIC) member countries. This motivated us to investigate this relationship within OIC member countries, which we view essential for several reasons. First, theoretical, and empirical results offered by the literature are far from being conclusive as the results yield contradictory conclusions. In other words, whether bank concentration contributes to overall economic growth or not is unclear as the current discussion on the topic is far from being complete. Second, the literature under review is primarily concerned with developed and developing countries. They focus more on U.S. and EU banks, thus largely ignoring OIC countries. Third, from an economic point of view, the majority of the OIC countries belong to the least developed and developing countries groups. At the same time, overall financial development is at very low levels, and there is an overwhelming corruption that may explain their overall underdevelopment. Fourth, it is argued that banks are the primary source of business finance in most of the countries (Deesomsak, Paudyal, & Pescetto, 2004; Ito, 2006; Lee & Hsieh, 2013a, 2013b; Mlachila, Park, & Yabara, 2013; Moyo, Nandwa, Oduor, & Simpasa, 2014). The same is true for OIC countries that have banking sector more developed than stock markets. Finally, it is worth looking at this relationship to see if results will be similar or different as compared to other studies covering different sets of countries. Since the OIC countries are heterogeneous in nature and consist of developing and emerging economies, the impact of bank concentration on economic growth may be reflected in different ways. Consequently, discovering these ways is crucial for a better understanding of the topic and coming up with policy recommendations.

Having said that, this paper seeks to remedy these issues through analysis of the existing literature and contribution to this growing area of research by exploring the impact of bank concentration on economic growth within OIC member countries. Using a panel data set consisting of developing and emerging economies of different financial structures and sizes, we will therefore test:

i. Does bank concentration impact economic growth within the OIC member countries positively or negatively?
ii. Furthermore, as there is a discrepancy between the sample countries and their socio-economic and financial development, we will also study whether these relationships differ once we split the data set into two subcategories, namely: (i) emerging and developing economies; and (ii) corrupted and less–corrupted countries.

The remainder of the paper is organized as follows: Section 2 provides a literature review; Section 3 describes the data and methodology used; Section 4; analyses empirical results; Section 5 is left for concluding remarks.

2. Literature Review

A large and growing body of literature has investigated the finance–growth nexus. The global trend of bank consolidation brought up another critical dimension on the topic by exploring bank concentration and economic growth relationship. In this regard, there are two primary, but contradicting views. On one side, some support a competitive banking structure as it promotes competitive market practices that lead to efficiency. Greater competition in the banking industry, among other things, makes credit cheaper and more available to all borrowers (Di Patti & Dell'Ariccia, 2004).

In contrast, a banking structure that is highly concentrated and with monopolistic power, in their view and according to economic theory, will be detrimental to economic growth. In general, a monopoly is associated with inefficient resource allocation where optimal levels and prices of products and services are not reached. Recent evidence suggests that banks with monopoly power tend to extract excessive rents from firms through higher loan rates, reduce credit availability in general, lead to financial barriers to entering markets, promote moral hazard problem and credit rationing by banks (Cetorelli & Strahan, 2006; Diallo & Koch, 2017; Fisman & Raturi, 2004; Guzman, 2000; Hannan, 1991; Stiglitz & Weiss, 1981).

A number of studies have found that a more competitive banking sector is conducive to firm creation, credit access (especially for new and small firms), and overall industrial and economic growth as a concentrated banking sector creates financial impediments for new firms (Beck, Demirgüç-Kunt, & Maksimovic, 2003; Black & Strahan, 2002; Carlin & Mayer, 2003; Cetorelli & Gambera, 2001; Cetorelli & Strahan, 2006; Claessens & Laeven, 2005). Similarly, Shaffer (1998) finds a positive association between household income growth and the number of banks in the market using U.S. cross-sectional data.

One of the rare studies focusing on the causality between banking concentration and economic growth and covering some of the OIC countries in the sample is a study by Ghasemi & Abdolshah (2014). By covering 15 countries over the period 2004–2011, they found a bi-directional relationship whereby bank monopoly power harms economic growth, and economic growth promotes bank monopoly power.

On the other side, Jackson and Thomas (1995), Petersen and Rajan (1995), and Cetorelli and Gambera (2001) find that local bank concentration helps small business firms in the U.S. to alleviate credit constraints more effectively. Similar findings are reported by Abuzayed and Al-Fayoumi (2016) for 15 Middle East and North African (MENA) countries and De Guevara and Maudos (2011)[1].

It has been argued that banks with monopolistic power (bank concentration) may spur economic growth as they are more capable of information collection, screening, and monitoring borrowers. These banks can sustain long-lasting relationships with their clients promoting financial stability since excessive competition between banks can result in a sort of financial instability (Di Patti & Dell'Ariccia, 2004).

Thus, contrary to the common wisdom that banking competition unequivocally leads to overall welfare, Cetorelli (2001) finds that there might be specific channels through which it may have adverse economic effects. Other studies also support this view (see Dewatripont & Maskin, 1995; Petersen & Rajan, 1995; Rajan & Zingales, 2001). In fact, based on the literature reviewed, Cetorelli (2001) further concludes that when it comes to the most desirable banking market structure neither extreme – monopoly or perfect competition – may be the best option. This is further substantiated by Deidda and Fattouh (2005) who claim that banking concentration exerts two opposite effects on growth: economies of specialization and duplication of banks' investment in fixed capital. The former is beneficial, and the latter is detrimental to economic growth (Deidda & Fattouh, 2005).

In short, it can be seen then that the current discussion on the topic is far from being complete. Furthermore, most studies on the topic have only focused on U.S. and EU markets in general and Organization for Economic Co-operation and Development (OECD) countries. The

[1] *De Guevara and Maudos (2011) find that bank market power increases economic growth only up to a certain point (an inverted–U–shape relationship).*

existing literature fails to address the issue from less-developed countries' points of view, and this analysis is necessary for a better understanding of the topic. Hence, this study provides an exciting opportunity to advance our knowledge of the bank concentration-economic growth relationship by looking at the issue using OIC countries as a sample. Not only that our study will investigate this relationship on the whole sample, but it will also divide the sample into two broad categories to get additional insights into this relationship. These two categories are: (i) developing– and emerging economies; and (ii) corrupted and less–corrupted countries within the OIC countries sample.

3. Data and Methodology

3.1 Sample Selection and Data Collection

Table 1: Selected OIC countries

No.	Country Name	No.	Country Name	No.	Country Name
1	Afghanistan	15	Jordan	29	Pakistan
2	Albania	16	Kazakhstan	30	Qatar
3	Algeria	17	Kuwait	31	Saudi Arabia
4	Azerbaijan	18	Kyrgyz	32	Senegal
5	Bahrain	19	Lebanon	33	Sierra Leone
6	Bangladesh	20	Libya	34	Sudan
7	Benin	21	Malaysia	35	Togo
8	Burkina-Faso	22	Mali	36	Tunisia
9	Cameroon	23	Mauritania	37	Turkey
10	Comoros	24	Morocco	38	Uganda
11	Egypt	25	Mozambique	39	United Arab Emirates
12	Gabon	26	Niger	40	Uzbekistan
13	Gambia	27	Nigeria	41	Yemen
14	Indonesia	28	Oman		

Initially, we wanted to include all 57 OIC member countries for the period between 2000 and 2015. However, after collecting the data, we had to drop certain countries and years for which there was no sufficient data. The inclusion of a country into our sample is subject to specific criteria. First, we include only those countries that have data for our dependant and independent variables, namely real per capita GDP, and concentration measures. Those countries that are missing these data are excluded from our sample. Second, we include only those countries that have at least three years of continuous observations. [2]Since we are using the GMM method, it is a minimum requirement for data to be processed. Hence, we removed single and two–year observations from our sample. Finally, to reduce the effect of possibly spurious outliers, we eliminate them in all variables by winsorizing at the 1st and 99th percentiles within each country (Beck et al., 2013). After applying these criteria, our final sample comes to a list of 41 countries and 650 observations. Table 1 presents the full sample of selected countries.

Furthermore, several studies investigated whether the effect of bank concentration/competition on economic growth is different when applied to developed and developing countries. The OIC group of countries provides a mixture, consisting of a majority

[2] *Beck et al. (2013) included countries with at least 2 years of continuous observations. However, since we are using GMM method, we opted for at least 3 years of continuous observations.*

of underdeveloped and developing countries with few countries belonging to the group of high–income countries. Thus, the sample offers a unique opportunity to investigate the hypothesis that bank concentration has a different effect on economic growth due to different economic development. As a result, we split our sample into two subcategories: developing– and emerging economies. Based on the World Bank classifications, countries are classified into four income categories, namely: low income, lower middle income, upper middle income, and high income. For this study, we combined low and lower-middle-income countries into developing economies.

Similarly, we combined upper middle income and high-income countries into emerging economies. The detailed classifications, according to the World Bank methodology, is presented in Table 2. Out of 41 countries in our sample, 25 or 60.98% fall under the developing economies group, while the remaining 16 or 39.02% of countries fall under the emerging economies group. We go a step further and investigate our sample from a corruption point of view. As a proxy measure of a level of corruption, we use control of corruption (estimate) data provided by the World Governance Indicator, the World Bank.

Table 2: Developing and Emerging Economies - OIC countries

Developing Economies		Emerging Economies	
Low Income	**Lower Middle Income**	**Upper Middle Income**	**High Income**
Afghanistan	Bangladesh	Albania	Bahrain
Benin	Cameroon	Algeria	Kuwait
Burkina-Faso	Comoros	Azerbaijan	Oman
Gambia	Egypt	Gabon	Qatar
Mali	Indonesia	Jordan	Saudi Arabia
Mozambique	Kyrgyz	Kazakhstan	United Arab Emirates
Niger	Mauritania	Lebanon	
Sierra Leone	Morocco	Libya	
Togo	Nigeria	Malaysia	
Uganda	Pakistan	Turkey	
Yemen	Senegal		
	Sudan		
	Tunisia		

Finally, the data will be obtained from BankFocus (earlier known as BankScope) database of Bureau van Dijk's company, International Monetary Fund, UNESCO Institute for Statistics and several World Bank's databases, namely the World Development Indicators, the Global Financial Development and the World Governance Indicators as pointed out in Table 3.

Table 3: Summary of All Variables

VARIABLES	SIGN	DEFINITION	SOURCE
DEPENDENT VARIABLE(S)			
Economic Growth	Gpc	The real per capita GDP.	WDI[a]
INDEPENDENT VARIABLE(S)			
Measures of Market Structure Concentration			
Concentration ratio 5-bank	CR5	A measure of the degree of competitiveness of the banking sector, proxied by the total assets of the five largest commercial banks as a share of total commercial banking assets.	BankFocus
Concentration ratio 3-bank	CR3	A measure of the degree of competitiveness of the banking sector, proxied by the total assets of the three largest commercial banks as a share of total commercial banking assets.	BankFocus
Herfindahl-Hirschman Index	HHI	HHI is defined as the sum of the square of the market shares (based on total assets) of all the banks that compete in the market.	WITS[b]
Measures of Market Power Concentration			
Lerner index	LI	A measure of market power in the banking market. It is defined as the difference between output prices and marginal costs (relative to prices).	BankFocus
Boone indicator	BI	A measure of the degree of competition, calculated as the elasticity of profits to marginal costs.	BankFocus
CONTROL VARIABLE(S)			
Country-Specific			
Gross capital formation	GCF	The net increase in physical assets (investment minus disposals) within the measurement period, and it can be measured as a ratio of GDP.	WDI
Trade openness	TO	The sum of exports and imports of goods and services measured as a share of GDP.	WDI
Government size	GS	Measured by the ratio of the government's final consumption expenditure to GDP.	WDI
Financial development P	FIN_p	A ratio of private credit by deposit money banks and other financial institutions to GDP.	IFS[c]
Financial development L	FIN_l	A ratio of liquid liabilities to GDP.	IFS
Inflation (GDP deflator)	I	Inflation-adjusted by the GDP deflator.	IMF[d]
Financial crisis	C	A dummy variable to capture the effect of the global financial crisis 2008-2009.	GFD
Developing economies	DEV	A dummy variable to capture the effect of a country's income level.	WDI
Corrupted countries	COR	A variable to capture the effect of corrupted countries.	WGI[e]
Bank-specific			
Bank non-interest income	BNI	Bank's income generated by noninterest related activities as a percentage of total income.	GFD
Bank cost to income	BCI	It measures overhead costs relative to gross revenues.	GFD[f]
Bank net interest margin	BNIM	The difference between the interest charged by the bank and the interest paid out to lenders.	WDI

[a] The World Development Indicators (WDI). The World Bank.
[b] The World Integrated Trade Solution (WITS). The World Bank.
[c] International Financial Statistics (IFS), International Monetary Fund (IMF)
[d] International Monetary Fund, International Financial Statistics and data files using World Bank data on the GDP deflator.
[e] World Governance Indicators (WGI). The World Bank.
f The Global Financial Development (GFD). The World Bank.

3.2 Descriptive Analysis: Overview

First of all, it is essential to note here that due to a potentially non-linear relationship between economic growth and control variables, and in line with prevailing literature, we transform all control variables (except crisis) into natural logarithm forms. Hence, we will use these variables in natural logarithm forms throughout the study (Naceur, Blotevogel, Fischer, & Shi, 2017).

Table 3 provides a summary of all variables, while Table 4 presents the summary statistics of our sample (in level forms). [3]The average GDP per capita (Gpc) is 7,697.77 US$ (constant 2010), [4]but there is wide cross–country variation in the sample with a low of 256.54 US$ to a high of around 72,670.96 US$. The lowest GDP per capita was recorded in 2000 by Mozambique, while the highest was recorded in 2011 by Qatar.

Table 4: Summary of Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Gpc	650	7,697.77	13,921.72	256.54	7,2670.96
CR5	534	83.22	14.74	33.42	100.00
CR3	639	70.87	18.03	23.32	100.00
HHI	549	0.13	0.10	0.03	0.67
LI	518	0.32	0.13	-0.39	0.64
BI	609	-0.06	0.17	-2.54	0.34
GCF	623	24.68	8.09	1.10	61.47
TO	633	76.15	34.71	21.45	220.41
GS	622	14.11	4.78	0.95	30.00
FIN_p	613	28.52	24.31	1.32	119.58
FIN_l	613	47.12	39.41	8.36	242.33
BNI	610	38.61	13.76	3.22	82.75
BCI	610	52.92	14.55	21.03	139.47
BNIM	648	4.96	2.69	0.57	18.63
I	649	7.08	9.85	-25.96	73.84
COR	557	-0.60	0.57	-1.64	1.57

Notes: Gpc is the real GDP per capita. CR5 is the 5-bank concentration ratio. CR3 is the 3-bank concentration ratio. HHI is the Herfindahl-Hirschman Index. LI is the Lerner index. BI is the Boone indicator. GCF is the gross capital formation. TO is the trade openness. GS is the government size. FIN_p is the ratio of private credit to GDP FIN_l is the ratio of liquid liabilities to GDP. BNI is the bank noninterest income to total income ratio. BCI is the bank cost to income ratio. BNIM is the bank net interest margin. I is the inflation (GDP deflator). COR is the control for corruption (estimate).

In addition, the average concentration ratio measured by CR5 is about 83% with a low of about 33% and a high value of 1 (i.e. 100%). The lowest point was recorded by Nigeria in 2001, while the highest was recorded by several countries (19 countries, to be precise). When measured by CR3, the average concentration ratio for our sample is about 71% with a low of about 23% and high values of 1 (i.e. 100%). The lowest concentration was found in the case of Nigeria in 2002. After that period, the concentration ratio in Nigeria was also on the rise, reaching the highest value of 71.09% in 2006. Similar to the CR5 case, the highest concentration point, and hence the highest concentration was recorded by 14 OIC member countries. Consequently, it can be concluded from the data before us that there is an overwhelming concentration of the banking sector in OIC countries. Similar findings are evidenced by the other measures of bank concentration/competition as well.

[3] *Please note that the data presented in this descriptive section are based on winsorized dataset to eliminate spurious outliers as explained briefly in the previous section.*

[4] *Here, for simplicity purposed we explain certain descriptive statistics using level forms for the data. Such is the case of GDP per capita.*

Table 5: Correlation Between Main Dependent and Independent Variables

Appendix B: Correlation coefficients of all variables

	Gpc	*CR5*	*CR3*	*HHI*	*LI*	*BI*	*GCF*	*TO*	*GS*	*FIN_p*	*FIN_I*	*BNI*	*BCI*	*BNIM*	*I*	*COR*	*C*	*DEV*
Gpc	1.0000																	
CR5	0.1432	1.0000																
CR3	0.1282	0.9108	1.0000															
HHI	0.0469	0.2687	0.2103	1.0000														
LI	0.4538	0.1892	0.0972	0.0809	1.0000													
BI	0.0972	0.1074	0.1147	-0.1639	0.1548	1.0000												
GCF	0.0701	0.0489	0.0873	0.1754	0.2915	0.1017	1.0000											
TO	0.3858	0.1826	0.2984	-0.0167	0.3093	0.1530	0.2095	1.0000										
GS	0.0344	0.3738	0.2928	0.0756	0.3561	0.1710	0.1732	0.2217	1.0000									
FIN_p	0.2379	-0.0978	0.0028	-0.2078	0.0008	0.1206	0.0240	0.6855	0.2188	1.0000								
FIN_I	0.0646	-0.1818	-0.0774	-0.1941	-0.1411	0.0858	0.0299	0.3990	0.1649	0.7775	1.0000							
BNI	-0.1070	0.1670	0.0926	0.0912	-0.0380	-0.0788	0.0068	-0.1546	-0.0166	-0.3414	-0.3120	1.0000						
BCI	-0.6178	-0.0463	-0.0441	0.1750	-0.5875	-0.2607	-0.2862	-0.4171	-0.0666	-0.3368	-0.1639	0.1986	1.0000					
BNIM	-0.3577	-0.1599	-0.1359	0.1034	-0.0760	-0.2597	-0.0607	-0.3626	-0.2599	-0.5789	-0.5088	0.0212	0.3954	1.0000				
I	0.1376	-0.0145	0.0274	-0.0341	0.0202	-0.0245	0.0333	-0.0035	-0.1731	-0.1820	-0.1890	-0.0107	-0.1210	0.1491	1.0000			
COR	0.1746	0.0051	0.0113	-0.0231	0.0091	-0.1393	0.0378	0.1075	-0.0022	0.0398	-0.1581	-0.1268	-0.0433	-0.1311	0.1522	1.0000		
C	-0.0391	0.0413	0.0621	0.0050	-0.0726	-0.0561	0.0335	-0.0012	-0.0326	0.0230	-0.0033	-0.0324	0.0183	0.0433	-0.0244	-0.0044	1.0000	
DEV	-0.5424	-0.0700	-0.1469	0.0706	-0.3489	-0.1787	-0.2327	-0.5579	-0.1576	-0.4318	-0.3847	0.3087	0.5987	0.3635	-0.1228	-0.0215	0.0356	1.0000

Notes: Gpc is the real GDP per capita. CR5 is the 5-bank concentration ratio. CR3 is the 3-bank concentration ratio. HHI is the Herfindahl-Hirschman Index. LI is the Lerner index. BI is the Boone indicator. GCF is the gross capital formation. TO is the trade openness. GS is the government size. FIN_p is the ratio of private credit to GDP FIN_I is the ratio of liquid liabilities to GDP. BNI is the bank noninterest income to total income ratio. BCI is the bank cost to income ratio. BNIM is the bank net interest margin. I is the inflation (GDP deflator). COR is the control for corruption (estimate). C is the crisis dummy variable. DEV is the dummy variable representing a developing economy.

The presence of the overwhelming bank concentration within the OIC member countries should not come as a surprise as overall underdevelopment is also evident from some indicators. One of them is the financial development variables used in this study. Measured as a ratio of private credit by deposit money banks and other financial institutions to GDP, the average financial development is around 28%, with a minimum and maximum being 1.32% and 119.58% respectively. When liquid liabilities measure financial development to GDP ratio, the average is around 47%, while a minimum and maximum are 8.32% and 242.33% respectively. Another indicator that shows the overall underdevelopment of our sample countries is the gross capital formation (GCF) variable. Its average is 24.68% of GDP, with a low value of 1.10 % for Sierra Leone recorded in 2000, and a high value of 61.47% for Mauritania recorded in 2005. Furthermore, Table 5 provides a correlation matrix among the study variables.

3.3 Data Descriptions

After reviewing the existing literature, it is evident that there are standard measures when it comes to measuring the economic growth of a country. Following Beck, Degryse, and Kneer (2014), as economic growth proxy, this study uses the real per capita GDP (Gpc). The data source of these variables is the World Development Indicators (WDI) Database.

When it comes to bank concentration/competition measures, several of them have been used in the literature. Perhaps the simplest and probably the most frequently used measure of bank concentration is the *k bank concentration ratio*. CR3 and CR5 are the most commonly used, representing the cumulative market share of the *k* largest banks in a country to the assets of the whole banking industry (Davis, 2007). Another measure is HHI index that takes into consideration the size distribution of all banks in the market making it better than the *k bank concentration ratio* (Carbó, Humphrey, Maudos, & Molyneux, 2009).

One of the most popular non–structural measures of market power is the Lerner index (LI), developed by Abraham P. Lerner (1934). In essence, the Lerner index, or degree of monopoly power, measures a bank's/firm's market power by calculating the difference between output prices and marginal costs (relative to prices), following the methodology described in Demirgüç-Kunt and Martínez Pería (2010).[5]

The usage of the Lerner index has several advantages over other measures of concentration /competition, especially those structural ones discussed earlier. Not only that the Lerner index can measure the market power of individual firms or specific products, but it can also measure the market power of the whole industry or market. As a result, it is considered as the only available measure of competition at the bank level (Berger, Klapper, & Turk-Ariss, 2009; Coccorese, 2009; Repkova, 2012).

other non–structural measure of competition is the Boone indicator (BI). While challenging the theoretical foundations of the Lerner's index, Boone (2004, 2008) proposed a macro–level index of competition that caters for some shortcomings of the Lerner index.i[6]

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[5] *Mathematically it is expressed as follows: Lerner Index = (P-MC)/P. Marginal cost is calculated using estimated translog cost function with respect to output and prices are calculated as total bank revenue over assets. For details see Demirgüç-Kunt and Martínez Pería (2010).*

[6] *Boone (2004, 2008) argued that the theoretical foundations of the existing price cost margin (PCM) measure of competition are not robust and proposed a macro–level index of competition. According to the Lerner index that is based on PCM, as competition increases in a given market/industry its PCM will decrease and finally reach zero in perfect competition. This may not be the case, Boone (2004, 2008) argues saying that in some cases a more intense*

Several country-specific control variables are used as well. For example, gross capital formation (GCF) is a control variable that reflects the overall economic development of a country. Levine & Renelt (1992) and Islam (1995) find a significantly positive effect of gross domestic investment (now known as capital formation) as a share of GDP on growth. Trade openness (TO), measured as the sum of exports and imports of goods and services as a share of GDP, is found to contribute positively to economic growth in a number of the existing empirical literature (Beck et al., 2014; Beck & Levine, 2004; Dollar, 1992; Dollar & Kraay, 2004).

The government size (GS) is the most frequently used variable as it measures overall economic development and government policies. In this study, we use the ratio of the government's final consumption expenditure to GDP. The financial crisis dummy (C) is used as an indicator of macroeconomic development. It takes the value of one for the year 2008 and 2009 and zeroes otherwise to capture the effect of the global financial crisis on economic growth. During a financial crisis, banks are faced with a few challenges that make them fragile. This brings about uncertainty in the market and increases overall risk.

As a financial development indicator, we use two measures:

i. a ratio of private credit by deposit money banks and other financial institutions to GDP (FIN_p) and it captures the allocation of credit by deposit money banks and other financial institutions relative to the size of the economy;
ii. a ratio of liquid liabilities to GDP (FIN_l) that measures banks' ability to mobilize funds or banking sector's size (see Abuzayed & Al-Fayoumi, 2016; Compton & Giedeman, 2011; Law & Singh, 2014). Both these ratios can be considered as part of overall institutional as well as banking development.

It is worth mentioning here that we opt for these two measures of financial development for mainly two reasons, namely:

i. financial development plays a crucial role in our study, and one of the objectives is the interaction between this variable and bank concentration measures;
ii. this approach can also be considered as a part of robustness check for the overall results.

As for ban-specific control variables, we use bank noninterest income (BNI), bank cost to income ratio (BCI), and bank net interest margin (BNIM). The BNI measures bank efficiency, overhead costs relative to gross revenues, with higher ratios indicating lower levels of cost-efficiency. The BCI measures overhead costs relative to gross revenues with higher ratios indicating lower levels of cost-efficiency. It is argued that bank efficiency and its stability promote economic growth through its impact on bank efficiency and stability (Beck et al., 2013). Finally, the BNIM is a measure of the difference between the interest paid and the interest received by banks. It is used as an indicator of the macroeconomic development of a country as it reflects the banks' efficiency.[7]

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competition may lead to higher PCM instead of lower margins. In this scenario, as further elaborated by Van Leuvensteijn et. al. (2011), "more efficient banks may have a higher PCM (skimming off part of the profits stemming from their efficiency lead), the increase of their market share may raise the industry's average PCM, contrary to common expectations" (p. 3158).

[7] *Boone (2004, 2008) argued that the theoretical foundations of the existing price cost margin (PCM) measure of competition are not robust and proposed a macro–level index of competition. According to the Lerner index that is based on PCM, as competition increases in a given market/industry its PCM will decrease and finally reach zero in perfect competition. This may not be the case, Boone (2004, 2008) argues saying that in some cases a more intense*

We use inflation as a control variable for overall macroeconomic conditions is inflation and a proxy for monetary (in)stability. Countries with high inflation tend to have financial systems that are generally underdeveloped and prone to financial crises (Boyd, Levine, & Smith, 2001; Demirgüç-Kunt & Detragiache, 1998).

Table 6: Expected impact of variables

<table>
<tr><th colspan="2">Variables</th><th>Sign</th><th>Expected Impact</th></tr>
<tr><td colspan="4">DEPENDENT VARIABLE(S)</td></tr>
<tr><td colspan="2">GDP per capita growth rate</td><td>Gpc</td><td></td></tr>
<tr><td colspan="4">INDEPENDENT VARIABLE(S)</td></tr>
<tr><td rowspan="7">Concentration Measures</td><td colspan="3">Measures of Market Structure Concentration</td></tr>
<tr><td>Concentration ratio – 5 top banks</td><td>CR5</td><td>+ | -</td></tr>
<tr><td>Concentration ratio - 3 top banks</td><td>CR3</td><td>+ | -</td></tr>
<tr><td>Herfindahl-Hirschman Index</td><td>HHI</td><td>+ | -</td></tr>
<tr><td colspan="3">Measures of Market Power Concentration</td></tr>
<tr><td>Lerner index</td><td>LI</td><td>+ | -</td></tr>
<tr><td>Boone indicator</td><td>BI</td><td>+ | -</td></tr>
<tr><td colspan="4">CONTROL VARIABLE(S)</td></tr>
<tr><td rowspan="4">Bank-Specific</td><td colspan="3">Bank-specific</td></tr>
<tr><td>Bank noninterest income (%)</td><td>BNI</td><td>+ | -</td></tr>
<tr><td>Bank cost to income ratio (%)</td><td>BCI</td><td>-</td></tr>
<tr><td>Bank net interest margin (%)</td><td>BNIM</td><td>+</td></tr>
<tr><td rowspan="18">Country-Specific</td><td colspan="3">Macroeconomic developments</td></tr>
<tr><td>Inflation (GDP deflator)</td><td>I</td><td>-</td></tr>
<tr><td>Financial crisis '08 & '09 (Dummy)</td><td>C</td><td>-</td></tr>
<tr><td>Trade openness</td><td>TO</td><td>+</td></tr>
<tr><td colspan="3">General economic development</td></tr>
<tr><td>Human capital accumulation</td><td>HC</td><td>+</td></tr>
<tr><td>Gross capital formation</td><td>GCF</td><td>+</td></tr>
<tr><td>Government size</td><td>GS</td><td>+ | -</td></tr>
<tr><td colspan="3">Financial development</td></tr>
<tr><td>Private credit by banks to GDP (%)</td><td>FIN_p</td><td>+ | -</td></tr>
<tr><td>Liquid liabilities to GDP (%)</td><td>FIN_l</td><td>+ | -</td></tr>
<tr><td colspan="3">Policy variables</td></tr>
<tr><td>Institutional development</td><td>ID</td><td>+</td></tr>
<tr><td colspan="3">Subgrouping</td></tr>
<tr><td>Developing economies (dummy)</td><td>DEV</td><td>+ | -</td></tr>
<tr><td>Corrupted countries (dummy)</td><td>COR</td><td>-</td></tr>
</table>

On top of that, we divided our sample into two sub-groups and introduced a dummy variable for each sub-group. The overall level of socio-economic development of a country may result in different effects of bank concentration on economic growth. Bank concentration has a significantly negative impact on economic growth low–income countries only (Abuzayed & Al-Fayoumi, 2016; Deidda & Fattouh, 2005; A. I. Fernández, González, & Suárez, 2010). Consequently, we introduced a dummy variable that takes the value of 1 for developing economies and 0 for emerging economies. Similarly, we introduced a corruption dummy (COR) variable to see how corruption level affects economic growth. A few studies indicate that corruption may have a positive effect on developing processes in the case of countries with excessive bureaucratic and regulatory obstacles (Bardhan, 1997; Leff, 1964). Overwhelming opinion, however, is that corruption has adverse effects not just on economic

competition may lead to higher PCM instead of lower margins. In this scenario, as further elaborated by Van Leuvensteijn et. al. (2011), "more efficient banks may have a higher PCM (skimming off part of the profits stemming from their efficiency lead), the increase of their market share may raise the industry's average PCM, contrary to common expectations" (p. 3158).

growth but also on political and institutional developments of a country (Bardhan, 1997; Robinson, 1998; Voskanyan, 2000).

Finally, Table 6 shows the expected impact of independent and control variables on economic growth.

3.4 Methodology

3.4.1 Baseline Empirical Methods

To assess the impact of the bank concentration on economic growth within the OIC member countries we will use a variant of the models used by Berger et al. (2009), Alin & Bogdan (2011), Fu et al. (2014), Fernández & Garza–García (2015) and Abojeib (2017). For example, Abojeib (2017) used this model to investigate the relationship between competition and stability. Hence, our baseline model is as follows:

$$Gpc_{i,t} = \alpha Gpc_{i,t-1} + \beta CON_{i,t} + \delta B_{i,t} + \theta C_{i,t} + \tau_t + \nu_i + \varepsilon_{i.t} \quad (1)$$

where,

$Gpc_{i,t}$ is the real per capita GDP of country *i* at time *t*, and where *i* denotes the cross-sectional dimension (i.e. country), and *t* denotes the time dimension (i.e. year).

$Gpc_{i,t-1}$ the lagged dependent variable is included to account for persistency in real per capita GDP.

$CON_{i,t}$ represents the concentration measure of country *i* at time *t* as measured by one of the concentration measures.

$B_{i,t}$ is a vector of bank-specific control variables

$C_{i,t}$ is a vector of country-specific control variables

τ_t is a year dummy to control for time-varying standard shocks

ν_i is a dummy to control for time-invariant country-specific factors, and

$\varepsilon_{i,t}$ is a residual value.

The sign and magnitude of β in the estimations' results using the model in *Eq. 1* would indicate the nature of the relationship between bank concentration and economic growth. This is because the marginal effect of bank concentration on economic growth is equal to the partial derivative of *Gpc* with respect to *CON* or mathematically:

$$\frac{\partial Gpc}{\partial CON} = \beta \quad (2)$$

The above model assumes that the relationship between concentration and economic growth is linear. However, several studies show that this relationship may be non–linear, after all. For instance, see Cetorelli & Gambera (2001), di Patti & Dell'Ariccia (2004), Berger *et al.* (2009), Fernández *et al.* (2010), Soedarmono (2010) and Ma & Song (2017). Hence, to investigate this empirically, we will use the following models for bank concentration–economic growth non-linear relationship:

$$\mathrm{Gpc}_{i,t} = \alpha\mathrm{Gpc}_{i,t-1} + \beta_1\mathrm{CON}_{i,t} + \beta_2\mathrm{CON}^2_{i,t} + \delta\mathrm{B}_{i,t} + \theta\mathrm{C}_{i,t} + \nu_i + \varepsilon_{i.t} \quad (3)$$

In this case, we want to see whether the effect of bank concentration is only demonstrated up to a certain limit after which its effect might change. In this case, the marginal effect of bank concentration on economic growth would be as follows:

$$\frac{\partial \mathrm{Gpc}}{\partial \mathrm{CON}} = \beta_1 + 2 * \beta_2\mathrm{CON} \quad (4)$$

The above equation represents a line with an intercept (β_1) and a slope ($2*\beta_2$) indicating that for each value of CON, the value of marginal effect would be different. The marginal effect would be zero when $CON = \frac{-\beta_1}{2\beta_2}$, which is called the inflection point or threshold level. However, depending on results from *Eq. 4* above, the marginal effect would be positive or negative for any value of concentration higher or lower than the inflection point value.

Finally, as there is a discrepancy between the sample countries and their socio-economic and financial development, we will also study whether these relationships differ once we split the dataset into two subcategories, namely: (i) emerging and developing economies; and (ii) corrupted and less–corrupted countries.

To test this claim, we introduce a dummy variable that takes the value of 1 for developing economies/corrupted countries and 0 for emerging economies/less corrupted ones. Hence, we modify *Eq. 1* by introducing interaction terms between the CON and developing economies (DEV_j)/corrupted countries (COR_j). Introducing the interaction term between CON and DEV/COR dummy would account for a potential difference in the concentration–growth relationship between developing and emerging economies on one side and corrupted and less corrupted OIC countries on the other. A similar approach has been taken by Deidda & Fattouh (2005), Fernández *et al.* (2010), and Abuzayed & Al–Fayoumi (2016). We get the following models:

$$\mathrm{Gpc}_{i,t} = \alpha\mathrm{Gpc}_{i,t-1} + \beta_1\mathrm{CON}_{i,t} + \beta_2\mathrm{DEV}_j + \beta_3(\mathrm{CON}_{i,t} \times \mathrm{DEV}_j) + \delta\mathrm{B}_{i,t} + \theta\mathrm{C}_{i,t} + \nu_i + \varepsilon_{i.t} \quad (5)$$

where *j* refers to emerging and developing economies, 0 for emerging and 1 for developing economy.

$$\mathrm{Gpc}_{i,t} = \alpha\mathrm{Gpc}_{i,t-1} + \beta_1\mathrm{CON}_{i,t} + \beta_2\mathrm{COR}_j + \beta_3(\mathrm{CON}_{i,t} \times \mathrm{COR}_j) + \delta\mathrm{B}_{i,t} + \theta\mathrm{C}_{i,t} + \nu_i + \varepsilon_{i.t} \quad (6)$$

where *j* refers to corrupted and less–corrupted country.

Thus, in both cases, when the dummy variable (DEV or COR) is equal to 0, the marginal effect of bank concentration on economic growth would be:

$$\frac{\partial \mathrm{Gpc}}{\partial \mathrm{CON}} = \beta_1 \quad (7)$$

In other words, the sign of β_1 indicates the sign of the bank concentration-economic growth relationship for emerging/less corrupted economies. On the other hand, when the dummy variable (DEV or COR) is equal to 1, the marginal effect equation would be:

$$\frac{\partial \mathrm{Gpc}}{\partial \mathrm{CON}} = \beta_1 + \beta_3 \quad (8)$$

In short, the significance or insignificance of $\beta_1+\beta_3$ will determine whether there is a relationship between bank concentration and economic growth for developing economies/corrupted countries. Finally, by comparing β_1 with $\beta_1+\beta_3$ that are representing the marginal effect for emerging/corrupted and developing/less corrupted economies respectively, we can find out the difference between both types of income-and corruption-level countries in terms of a concentration-growth relationship.

3.4.2 Estimation Method

To date, various methods have been developed and introduced to measure bank concentration-growth relationships. Having in mind the fact that we are dealing with a dynamic panel dataset with a large number of cross-sections (*N*) and a small number of time periods (*T*), and following the existing literature on the topic, we will employ the generalized method of moments (GMM) estimators in our analysis.

The initial GMM method was formalized by Hansen (1982), subsequently developed by Holtz–Eakin, Newey, & Rosen (1988), Arellano & Bond (1991), Arellano and Bover (1995), Blundell and Bond (1998) and Bond, Hoeffler, & Temple (2001) and became known in the literature as difference GMM and system GMM estimators.

Both GMM estimators address the bias problems encountered by the OLS method and were developed for dynamic panel data models with many cross-section units (***N***) and a small number of time periods (***T***). They allow for the endogeneity of regressors (meaning that one or more of the regressors can be correlated with the error term), fixed effects, heteroskedasticity and autocorrelation within individuals. They can take care of unobserved country-specific effects (Roodman, 2009a).

Both estimators fit our model using linear GMM. The difference GMM, also known as Arellano–Bond estimator, was operationalized by Arellano & Bond (1991) whereby the estimation is proceeded by transforming all regressors, usually by differencing, in order to eliminate the fixed effect (Roodman, 2009b). However, this estimator may lead to poor results and large sample bias. Hence, to address this issue, Arellano & Bover (1995) and Blundell & Bond (1998) developed the *system GMM* which combines in a system the regression in differences with the regression in levels, i.e. it combines two equations (the original and the transformed one) in a system. In other words, "where lagged variables in levels instrument the differenced equation, lagged differences now instrument levels" (Roodman, 2009b, p. 138). This can improve efficiency and allows the introduction of more instruments (Roodman, 2009a).[8] Consequently, the system GMM method is much more consistent, asymptotically normally distributed, and efficient in estimating the coefficients of the model and in solving the problems of endogeneity, heteroscedasticity, and autocorrelation (Arellano & Bover, 1995; Hsiao, 2007).

The consistency of the GMM estimator relies on two hypotheses. First, the assumption on validity (exogenous) of the instruments used. Second, the assumption that the differenced error terms do not exhibit second– or higher-order serial correlation. In order to ensure the GMM estimation validity and test the above hypotheses, we will run two specification tests suggested by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998).

The first hypothesis, i.e. the validity of instruments, is tested using Sargan and Hansen test of over-identifying restrictions. It tests the overall validity of the instruments by analysing the sample analogy of the moment conditions used in the estimation procedure. The null hypothesis is that there is no correlation between the residuals and the instrumental variables (Beck & Levine,

[8] For detailed discussions about the GMM methods, see Roodman (2009a, 2009b) and Zsohar (2012), among others.

2004). The second hypothesis, i.e. no second-order serial correlation, is tested using Arellano–Bond tests for first-order autocorrelation (AR1) and second-order autocorrelation (AR2). Failure to reject the null hypothesises of both tests gives support to our model (Beck & Levine, 2004; Boyd et al., 2001).

To sum up, dynamic panel techniques, such as GMM methods, fulfils the requirements of our proposed study since we have a relatively low number of years and a large number of cross-sections per year, i.e. unbalanced panel. However, due to the structure of our dataset, overall superiority of the system GMM and for the consistency of our interpretations, we will use the system GMM for all models in the text.

4. Empirical Results and Discussion

To get our results, we employ GMM for reasons explained earlier. We use the STATA software version 14.2 and Roodman's (2009) *xtabond2* command due to its more flexible features over the built-in command. Given the models, we treat all explanatory variables to be weakly exogenous. Furthermore, in all our models, we use the year dummies (2000-2015) to control for potential time shocks not captured in our specifications. Nevertheless, due to the lack of informative content of these variables and space constraints, we opt not to report them in our tables.

4.1 Main Results

4.1.1. Baseline Results

Table 7 provides estimation results of equations (*Eq. 1*) using the two-step robust system GMM estimation methods. More specifically, this table presents the effect of bank market structure and market power, measured by concentration ratio of top 3 banks (CR3) and Lerner index (LI) respectively, on economic growth measured by the real per capita GDP (Gpc). While doing so, we use sets of banks–specific and country-specific variables discussed earlier.[9]

Furthermore, throughout this study, we will use two proxies for financial development, namely private credit to GDP ratio (FIN_p) and liquid liabilities to GDP ratio (FIN_l). Hence, the results in each panel of Table 7 are organized as follows: (i) Models (1)–(3) and (7)–(9) are using FIN_p; and (ii) Models (4)–(6) and (10)–(12) are using FIN_l for CR3 and LI Models respectively.

Note that Models (1), (4), (7), and (10) report results using only country-specific control variables. Models (2), (5), (8), and (11), on the other hand, provide estimation results using both banks- and country-specific control variables. Finally, under the Models (3), (6), (9) and (12) we consider the global financial crisis (C) and inflation (INF) to investigate their possible effects and significance on the economic growth. This format will be applied throughout all regression results tables where applicable.[10]

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[9] Initially, we started with all control variables, then, the insignificant ones are excluded gradually (one by one). These initial results using all control variables, however, are nor reported.

[10] After running regressions using several models applicable in our studies, it turns out that the financial crisis is insignificant in most cases. Hence, for brevity of results interpretation, we excluded this control variable from other models.

Diagnostic statistics, reported at the bottom of every table, imply adequacy of GMM estimations. More specifically, the autoregressive coefficients indicate significant persistence required for using GMM. Furthermore, the autocorrelation tests of the first–differenced residuals suggest the presence of autocorrelation of order 1 (AR1) in all cases but fail to reject the null of no autocorrelation of order 2 (AR2). These results indicate that the residuals in *Eq. 1* are free from the autocorrelation problem in all models. Finally, we use the Hansen's *J* test to test for the relevance and validity of the instruments used. Accordingly, the Hansen test statistics confirm the validity of instruments used in our estimation models.

Table 7: Concentration – Growth Relationship: Linear Model – Baseline Results

Variables	Panel A - CR3						Panel B - LI					
	FIN_p			FIN_l			FIN_p			FIN_l		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
lnGpc $_{t-1}$	0.984***	0.939***	0.946***	0.978***	0.931***	0.942***	1.036***	1.113***	1.063***	1.098***	0.868***	0.893***
	[0.009]	[0.021]	[0.011]	[0.007]	[0.023]	[0.013]	[0.024]	[0.059]	[0.065]	[0.051]	[0.133]	[0.129]
CR3	-0.056***	-0.090**	-0.086***	-0.065***	-0.094*	-0.087**						
	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]						
LI							-0.152**	-0.093	-0.000	-0.337*	0.084	0.150
							[0.070]	[0.125]	[0.022]	[0.201]	[0.202]	[0.272]
lnFIN_p	-0.002	-0.010	-0.003				-0.044**	-0.064**	-0.070***			
	[0.008]	[0.012]	[0.014]				[0.022]	[0.031]	[0.023]			
lnFIN_l				-0.001	-0.035*	-0.033*				-0.129*	-0.021	-0.028
				[0.009]	[0.018]	[0.018]				[0.070]	[0.055]	[0.074]
lnGCF	0.031**	0.027	0.040	0.030**	0.027	0.027	0.023*	0.063*	0.032**	0.034	0.032	0.028
	[0.012]	[0.025]	[0.026]	[0.015]	[0.027]	[0.026]	[0.013]	[0.036]	[0.016]	[0.033]	[0.081]	[0.098]
lnTO	0.029**	0.067**	0.052**	0.040***	0.081**	0.069**	-0.019	-0.018	-0.011	-0.021	0.109	0.104
	[0.013]	[0.027]	[0.024]	[0.014]	[0.033]	[0.028]	[0.020]	[0.048]	[0.021]	[0.038]	[0.115]	[0.132]
lnGS	-0.025***	-0.022	-0.012	-0.025**	-0.021	-0.001	0.006	-0.023	-0.049**	-0.019	-0.029	-0.022
	[0.009]	[0.028]	[0.023]	[0.010]	[0.028]	[0.019]	[0.017]	[0.052]	[0.025]	[0.047]	[0.071]	[0.095]
lnBNI		-0.037**	-0.022		-0.055**	-0.045*		0.118*	0.016		-0.137	-0.110
		[0.018]	[0.020]		[0.024]	[0.024]		[0.065]	[0.013]		[0.137]	[0.146]
lnBCI		-0.112**	-0.092***		-0.126**	-0.096***		0.186	-0.010		-0.188	-0.120
		[0.056]	[0.032]		[0.062]	[0.035]		[0.149]	[0.010]		[0.226]	[0.203]
lnBNIM		-0.041***	-0.038***		-0.062***	-0.057***		0.067	-0.008**		-0.113	-0.102
		[0.013]	[0.014]		[0.019]	[0.015]		[0.047]	[0.004]		[0.125]	[0.140]
lnINF			0.009***			0.008***			0.001			0.008
			[0.002]			[0.003]			[0.001]			[0.011]
C			-0.009			-0.008			-0.002			-0.009
			[0.006]			[0.005]			[0.003]			[0.015]
Constant	0.033	0.925**	0.683***	0.043	1.177**	0.896***	-0.086	-1.957	-0.184	-0.134	2.010	1.434
	[0.036]	[0.396]	[0.252]	[0.038]	[0.492]	[0.306]	[0.062]	[1.215]	[0.506]	[0.170]	[2.229]	[2.165]
Observations	548	514	463	548	514	463	461	461	422	461	461	422
No. of instruments	34	35	37	34	35	37	10	21	22	18	15	17
No. of groups	39	39	39	39	39	39	37	37	37	37	37	37
Arellano-Bond: AR (1)	0.013	0.001	0.001	0.011	0.001	0.001	0.014	0.050	0.027	0.041	0.053	0.048
Arellano-Bond: AR (2)	0.209	0.219	0.220	0.213	0.120	0.111	0.173	0.535	0.114	0.488	0.106	0.114
Hansen test (p-val)	0.247	0.566	0.826	0.288	0.683	0.906	0.108	0.788	0.177	0.357	0.613	0.829

Notes: *(i) Standard errors in brackets, (ii) * p<0.1, ** p<0.05, *** p<0.01.*

lnGpc is the natural log of the real GDP per capita. CR3 is the 3-bank concentration ratio (due to low values; we multiplied the coefficients by 100). LI is the Lerner index. lnFIN_p is the natural log of the ratio of private credit to GDP. lnFIN_l is the natural log of the ratio of liquid liabilities to GDP. lnGCF is the natural log of the gross capital formation. lnTO is the natural log of trade openness. lnGS is the natural log of the government size. lnBNI is the natural log of the bank noninterest income to total income ratio. lnBCI is the natural log of the bank cost to income ratio. lnBNIM is the natural log of the bank net interest margin. lnINF is the natural log of inflation. C is the crisis dummy variable.

Bank market structure, as measured by CR3 in Table 7, is found to be negatively significant in all estimations. The same relationship is evidenced when using LI as the primary independent variable, but only in two models, Model (7) and Model (10). Obviously, the results indicate a negative relationship between bank concentration and real per capita GDP (Gpc), regardless of whether we use market structure (CR3) or market power (LI) measure as proxies for bank concentration. For instance, Model (1) suggests that *ceteris paribus*, the impact of one standard deviation increase in bank concentration (CR3) decreases real per capita GDP by about 1.8%. Similarly, Model (10) suggests that *ceteris paribus*, the impact of one standard deviation increase in bank market power (LI) decreases real per capita GDP by about 4%.

The findings support the competitive banking structure view and are consistent with the results found by Black & Strahan, (2002), Beck *et al.* (2003), Carlin & Mayer (2003), Deidda and Fattouh (2005), Cetorelli & Strahan (2006), Fernández *et al.* (2010), Ferreira (2012), Ghasemi & Abdolshah (2014), Abuzayed & Al–Fayoumi (2016) and Diallo and Koch (2017). The results, however, are in contrast to Petersen and Rajan (1995), Maudos & de Guevara (2006), and Abuzayed & Al–Fayoumi (2016), among others, who found a positive relationship between bank concentration and economic growth.

As for the control variables, the results are somehow mixed. By looking at the country-specific or macroeconomic control variables, trade openness (TO) shows a positively significant impact on Gpc in all models under Panel A, while gross capital formation (GCF) and government size (GS) are positively and negatively significant in Models (1) and (4), respectively. The findings are in line with existing literature that shows the negative impact of a large public sector on economic growth (Baklouti & Boujelbene, 2016; Nyasha & Odhiambo, 2019; Sheehey, 1993). In other words, the impact of GS depends on the relative size of the public sector and the level of Gpc. Given the fact that the majority of OIC countries are overburdened with large public sectors that are, in most cases, ineffective and corrupt, finding a negative relationship is not a surprise.

In Panel B, however, where LI is used as a proxy for bank concentration GCF is the only control variable positively significant in Models (7–9). For instance, an increase of 1% in GCF under Model (8) would increase Gpc by 0.06%.

Similar results are found in the case of bank-specific control variables. Almost all variables are significant, indicating a negative impact on Gpc, at least when CR3 is used as a proxy for bank market structure (Panel A). Taking Model (2) as an illustration, the impact of 1% increase in bank noninterest income (BNI), bank cost to income ratio (BCI), and bank net interest margin (BNIM) would decrease Gpc by about 0.04%, 0.11% and 0.04%, respectively. In Panel B, however, only BNI is significant, with rather a positive impact on Gpc. In addition, the results indicate a positive effect of inflation (INF) on Gpc in all four Models, but the coefficients are significant in only three models, Models (3), (6), and (9). Contrary to that, crisis (C) is significant only in Model (9) indicating a negative impact on Gpc.

Finally, since we are interested in financial development as well, it is worth noting that financial development proxies, FIN_p and FIN_l, have significant adverse effects on real per capita GDP (Gpc) in five cases. Although this might be counterintuitive, these results are in line with findings reported by Shen and Lee (2006), Bezemer, Grydaki, and Zhang (2014), Samargandi, Fidrmuc, and Ghosh (2015) and Benczúr, Karagiannis, and Kvedaras (2019). It seems that the composition of credit has changed over the years and the results are negative since most of the credit goes to financial assets, thus not contributing to the growth. Similarly, Naceur et al. (2017) found that thresholds mark the finance–growth relationship, and it depends on income level, policy regime, institutional quality, and region of a given country.

To sum up, these baseline results are preliminary as there might be some other conditions that might influence the bank concentration-economic growth relationship. This may include non-linearity, income level, and corruption level to which we now turn.

Table 8: Concentration – Growth Relationship: Non–Linear Model

Variables	Panel A - CR3						Panel B - LI					
	FIN_p			FIN_l			FIN_p			FIN_l		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
lnGpc $_{t-1}$	0.984***	0.941***	0.956***	0.978***	0.933***	0.944***	1.036***	1.192***	1.022***	1.090***	0.832***	0.866***
	[0.008]	[0.021]	[0.013]	[0.007]	[0.020]	[0.013]	[0.028]	[0.104]	[0.066]	[0.046]	[0.163]	[0.104]
CR3	0.201*	0.063	0.023	0.196	0.045	-0.025						
	[0.001]	[0.002]	[0.001]	[0.001]	[0.002]	[0.002]						
CR3SQR	-0.001**	-0.001	-0.001	-0.002**	-0.001	-0.000						
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]						
LI							0.404*	1.051*	0.272	0.370	-0.236	-0.177
							[0.209]	[0.607]	[0.285]	[0.242]	[0.529]	[0.377]
LISQR							-0.816*	-1.932*	-0.478	-1.056*	0.556	0.457
							[0.433]	[1.049]	[0.515]	[0.573]	[1.082]	[0.808]
lnFIN_p	-0.002	-0.011	-0.003				-0.039	-0.106*	-0.018			
	[0.007]	[0.012]	[0.011]				[0.026]	[0.058]	[0.034]			
lnFIN_l				-0.002	-0.035**	-0.031*				-0.121**	-0.022	-0.010
				[0.008]	[0.017]	[0.017]				[0.059]	[0.050]	[0.038]
lnGCF	0.029**	0.023	0.025	0.027**	0.024	0.027	0.018	0.034	0.025	-0.006	0.025	0.009
	[0.012]	[0.025]	[0.021]	[0.013]	[0.027]	[0.028]	[0.016]	[0.057]	[0.019]	[0.032]	[0.072]	[0.053]
lnTO	0.031**	0.069**	0.044*	0.040***	0.081**	0.068**	-0.002	-0.028	-0.002	-0.013	0.139	0.099
	[0.013]	[0.030]	[0.023]	[0.013]	[0.032]	[0.028]	[0.023]	[0.077]	[0.029]	[0.042]	[0.132]	[0.096]
lnGS	-0.030***	-0.023	-0.018	-0.029***	-0.023	-0.004	-0.016	0.029	-0.004	-0.016	-0.052	-0.041
	[0.010]	[0.028]	[0.019]	[0.011]	[0.025]	[0.018]	[0.026]	[0.089]	[0.038]	[0.045]	[0.064]	[0.058]
lnBNI		-0.037**	-0.021		-0.055**	-0.042*		0.176	0.010		-0.174	-0.130
		[0.018]	[0.017]		[0.022]	[0.024]		[0.112]	[0.057]		[0.165]	[0.118]
lnBCI		-0.105**	-0.075**		-0.119**	-0.090***		0.204	0.027		-0.256	-0.208
		[0.051]	[0.029]		[0.052]	[0.032]		[0.160]	[0.073]		[0.271]	[0.148]
lnBNIM		-0.040***	-0.032**		-0.060***	-0.054***		0.084	0.005		-0.146	-0.137
		[0.014]	[0.015]		[0.016]	[0.014]		[0.060]	[0.038]		[0.145]	[0.122]
lnINF			0.008***			0.008***			-0.000			0.015
			[0.003]			[0.003]			[0.007]			[0.011]
C			-0.007			-0.008			-0.003			-0.009
			[0.005]			[0.005]			[0.008]			[0.011]
Constant	-0.030	0.843**	0.588***	-0.018	1.099***	0.827***	-0.178	-2.889*	-0.334	-0.116	2.741	2.231
	[0.041]	[0.348]	[0.214]	[0.043]	[0.397]	[0.266]	[0.146]	[1.600]	[0.926]	[0.215]	[2.784]	[1.762]
Observations	548	514	463	548	514	463	461	461	422	461	461	422
No. of instruments	35	36	38	35	36	38	21	19	21	15	15	16
No. of groups	39	39	39	39	39	39	37	37	37	37	37	37
Arellano-Bond: AR(1)	0.009	0.001	0.001	0.008	0.001	0.001	0.006	0.099	0.021	0.036	0.084	0.089
Arellano-Bond: AR(2)	0.212	0.211	0.212	0.215	0.113	0.114	0.131	0.540	0.100	0.494	0.143	0.148
Hansen test (p-val)	0.294	0.529	0.730	0.327	0.686	0.891	0.101	0.464	0.102	0.120	0.371	0.429

Notes: *(i) Standard errors in brackets, (ii) * p<0.1, ** p<0.05, *** p<0.01.*
lnGpc is the natural log of the real GDP per capita. CR3 is the 3-bank concentration ratio (due to low values; we multiplied the coefficients by 100). CR3SQR is the square term of CR3 (multiplied by 100). LI is the Lerner index. LISQR is the square term of LI. lnFIN_p is the natural log of the ratio of private credit to GDP. lnFIN_l is the natural log of the ratio of liquid liabilities to GDP. lnGCF is the natural log of the gross capital formation. lnTO is the natural log of trade openness. lnGS is the natural log of the government size. lnBNI is the natural log of the bank noninterest income to total income ratio. lnBCI is the natural log of the bank cost to income ratio. lnBNIM is the natural log of the bank net interest margin. lnINF is the natural log of inflation. C is the crisis dummy variable.

4.1.2. Non–Linear Bank Market Structure & Economic Growth Relationships

By investigating non–linearity of this relationship, we are simply testing whether the effect of bank concentration on economic growth depends on its degree/level. Looking from a bank's perspective, experiencing some sort of bank power and/or concentration has its advantages and disadvantages as well. On one side, a bank may become more careful in credit analysis and investment opportunities, and at the same time as its power increases its ability to cope with losses improves. On the other hand, as its market power increases, it may induce bank's managers to take on riskier projects, thus increasing its probability of default and bad loans.

Our baseline model presented in the previous section is modified by including a quadratic term of bank market structure, namely CR3SQR and LISQR, as explained in the *Data and Methodology* chapter. Table 8 represents various estimations of a non–linear model using CR3 and LI as market structure measures, respectively.

Diagnostic statistics imply the adequacy of GMM estimations and confirm the validity of instruments used in our estimation models. With the addition of quadratic terms, CR3SQR and LISQR, most linear coefficients of the bank market structure turn out to be insignificant. However, the results in this table show some evidence that there is a non-linear relationship between the bank market structure and economic growth. This is especially true for Model (1) using CR3 and Models (7–8) using LI. In these cases, the results indicate the existence of a threshold and that there is an "inverted U–shaped" relationship. These findings are similar to those reported by De Guevara and Maudos (2011).

Taking into consideration Model (1), we find that there is an inverted U-shaped relationship between CR3 and Gpc. The cut-off point is 53.68, indicating that countries with CR3 below 53.68 have a positive impact of CR3 on Gpc, while in countries with CR3 above 53.68 this impact is negative. In general, however, most countries (80% of the data) lie above this cut-off point, indicating that the bank concentration-economic growth relationship is significantly negative. Similarly, the results obtained for LI in Model (7) show that the cut-off point is 0.247. Countries with LI below this cut-off point are experiencing a positive impact of LI on Gpc, while those above it show evidence of a negative impact of LI on Gpc. It is found, however, that 70% of data are above the cut-off point demonstrating a significant and negative relationship as well.

Finally, financial development proxies indicate a negative impact on economic growth, but their significance is confirmed only in four cases. Similar results for control variables, including inflation, are found in Panel A, where CR3 is used, but this is not the case when LI is used in Panel B.

All in all, we can conclude that at low levels of concentration, an increase in bank concertation increases growth. However, when a banking sector becomes more and more concentrated, the negative impact is coming in, and it reduces growth. Given that the concentration measures in many of the sample countries are above the threshold value, it means that the bank concentration is primarily decreasing economic growth within the sample.

4.1.3. Income Levels, Bank Market Structure & Economic Growth Relationships

The discussion so far focused on the general equations of the baseline and non–linear models, forcing the effect of bank concentration on economic growth to be identical even though a country might be classified as a developing or emerging economy. This is to say that estimations in Table 7 based on our original *Eq. 1* and Table 8 based on our original *Eq. 3* do not address whether this relationship depends on a country's income level. As part of our research objectives, we want to investigate whether the effect of bank concentration on economic growth is significantly different for developing economies in this subsection and for corrupted countries in the following one.

Table 9: Concentration – Growth Relationship – Developing Economies

Variables	Panel A - CR3				Panel B - LI			
	FIN_p		FIN_l		FIN_p		FIN_l	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
lnGpc $_{t-1}$	0.921***	0.858***	0.876***	0.884***	0.952***	0.812***	1.067***	1.034***
	[0.017]	[0.049]	[0.038]	[0.032]	[0.025]	[0.121]	[0.152]	[0.077]
CR3	0.003	0.327	-0.040	0.088				
	[0.001]	[0.003]	[0.001]	[0.003]				
CR3SQR		-0.002		-0.001				
		[0.000]		[0.000]				
LI					0.117	0.130	0.045	-0.270
					[0.093]	[0.122]	[0.083]	[0.542]
LISQR						-0.224		0.002
						[0.159]		[0.630]
DEV	-0.077	-0.087	-0.101	-0.086	-0.077	-0.562	0.141	0.015
	[0.063]	[0.101]	[0.076]	[0.090]	[0.053]	[0.454]	[0.374]	[0.123]
CR3xDEV	-0.001*	-0.003***	-0.002***	-0.002***				
	[0.001]	[0.001]	[0.001]	[0.001]				
LIxDEV					-0.069	0.005	-0.084	0.213
					[0.093]	[0.065]	[0.126]	[0.269]
lnFIN_p	0.021	0.040*			0.016	0.049		
	[0.014]	[0.024]			[0.019]	[0.045]		
lnFIN_l			-0.003	-0.010			-0.075	-0.046
			[0.023]	[0.020]			[0.077]	[0.046]
lnGCF	0.003	0.014	0.017	0.024	0.022	-0.010	0.013	0.031
	[0.016]	[0.034]	[0.030]	[0.028]	[0.025]	[0.025]	[0.017]	[0.046]
lnTO	0.017	0.014	0.047*	0.037	0.008	0.055***	0.065**	0.041
	[0.012]	[0.024]	[0.024]	[0.023]	[0.022]	[0.021]	[0.031]	[0.040]
lnGS	-0.043**	-0.074*	-0.060**	-0.067**	-0.040*	-0.042	0.025	-0.051
	[0.020]	[0.040]	[0.029]	[0.026]	[0.024]	[0.048]	[0.040]	[0.059]
Constant	0.708***	1.129**	1.085***	1.025***	0.373*	1.561	-0.694	-0.185
	[0.176]	[0.476]	[0.324]	[0.334]	[0.218]	[1.155]	[1.348]	[0.610]
$\beta_1 + \beta_3$	-0.001***	0.000	-0.003***	-0.001	0.048	0.135	-0.038	-0.058
	[0.000]	[0.003]	[0.001]	[0.003]	[0.059]	[0.086]	[0.065]	[0.388]
Observations	548	548	548	548	461	461	461	461
No. of instruments	36	19	16	20	34	19	13	17
No. of groups	39	39	39	39	37	37	37	37
Arellano-Bond: AR (1)	0.007	0.004	0.002	0.001	0.014	0.034	0.020	0.019
Arellano-Bond: AR (2)	0.228	0.245	0.239	0.234	0.030	0.112	0.110	0.146
Hansen test (p-val)	0.357	0.209	0.238	0.228	0.236	0.070	0.323	0.624

Notes: *(i) Standard errors in brackets, (ii) * p<0.1, ** p<0.05, *** p<0.01.*
lnGpc is the natural log of the real GDP per capita. CR3 is the 3-bank concentration ratio (due to low values; we multiplied the coefficients by 100). CR3SQR is the square term of CR3 (multiplied by 100). LI is the Lerner index. LISQR is the square term of LI. DEV is the dummy variable representing a developing economy. CR3xDEV is the interaction term between CR3 and DEV. LIxDEV is the interaction term between LI and DEV. lnFIN_p is the natural log of the ratio of private credit to GDP. lnFIN_l is the natural log of the ratio of liquid liabilities to GDP. lnGCF is the natural log of the gross capital formation. lnTO is the natural log of trade openness. lnGS is the natural log of the government size.

In order to investigate this empirically, we introduce a dummy variable DEV that takes a value of 1 if a country is classified as a developing economy and 0 if it is classified as an emerging economy based on the World Bank classification[11] Further, we interact this dummy variable

[11] Note, that in case of interaction models, we are using only country-specific control variables. Furthermore, in case of non–linear models where we have CR3 and CR3SQR in Panel A and LI and LISQR in Panel B, we may interact with the developing economies dummy (DEV) each one of them or only one. As per preliminary testing results (not

with each measure of bank market structure, namely CR3 and LI. Hence, we get CR3xDEV and LIxDEV as interaction terms as presented in *Eq. 5* (baseline model) and *Eq. 8* (non-linear model) in the previous subsection. This is done to allow the relationship between CR3 and Gpc and similarly, the relationship between LI and Gpc to be different for developing and emerging economies. Table 9 presents the results for both baseline and non–linear models.

Diagnostic statistics imply adequacy of GMM estimations and confirm the validity of instruments used in our estimation models except for Model (5) where the autocorrelation tests of residuals suggest the presence of autocorrelation of order 2 (AR2), indicating the autocorrelation problem.

Coefficients of the market structure and the market power are insignificant throughout. However, the interaction term between concentration and developing economies is negatively significant. In other words, the impact of the market structure and the market power are not significant for emerging economies, but they bring a negative impact on growth for developing economies.

This has been pointed out by Brambor *et al.* (2006). He says that when it comes to interaction terms models, the coefficient CR3/LI only captures the effect of CR3/LI on Gpc when DEV is zero. Similarly, it should be evident that the coefficient on DEV only captures the effect of DEV on Gpc when CR3/LI is zero. Thus, the sign of the interaction term can be interpreted when the coefficients are jointly significant, even if the interaction term coefficient alone is found to be insignificant—in other words, testing whether CR3 + CR3xDEV = 0 is more crucial than looking at the significance/insignificance of the interaction term itself. [12] In particular, in emerging economies, the bank concentration has no impact on Gpc, while it has a negative impact on Gpc in developing economies, based on results in Table 9. In other words, this interaction model asserts that the effect of a change in CR3 on Gpc depends on the value of the conditioning variable DEV. Taking Model (3) as an example, given one standard deviation increase in CR3 it would decrease Gpc by approximately 5.4% if a country belongs to the developing economies group, while it will have no impact if a country belongs to the emerging economies group. [13]

4.1.4. Corruption, Bank Market Structure & Economic Growth Relationships

Finally, as it was briefly mentioned in the previous subsection, we want to investigate whether the impact of the bank concentration on economic growth yields to same results for countries that are classified as corrupted or less–corrupted or it would yield to relatively similar results. The approach is like the previous model, except that we use control of corruption (COR) variable. Similarly, we interact with this COR variable with each measure of bank market structure, namely CR3 and LI. Hence, we get CR3xCOR and LIxCOR as interaction terms.

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reported here), when we include interaction terms for both, linear and non–linear terms, the results show insignificance of all interaction terms and even insignificance of bank concentration terms. Hence, we conclude that it is better to interact only CR3 and LI as presented in Table 9.

12 Testing joint significance of CR3 + CR3xDEV and/or LI + LIxDEV is presented in the table as $\beta_1 + \beta_3 = 0$.

13 To explain this issue further and to be more precise, let us assume that CR3 coefficient in Model (3) is significant. In that case, the marginal effect for high-income countries is $\partial Gpc / \partial CR3 = \beta_1 = -0.0003975$, while the marginal effect for low-income countries is $\partial Gpc / \partial CR3 = \beta_1 + \beta_3 = -0.0003975 - 0.0023584 = -0.0027559 \approx -0.003$. This suggests that an increase in CR3 for one standard deviation would cause a negative change on Gpc by approximately 0.7% for high-income countries, while it would cause a higher negative change by 4.9% if a country belongs to low-income countries group.

This is done to allow the relationship between CR3 and Gpc and similarly, the relationship between LI and Gpc to be different for corrupted and less–corrupted countries. Table 10 presents the results for these relationships.

Table 10: Concentration – Growth Relationship – Corrupted Countries

Variables	Panel A - CR3				Panel B - LI			
	FIN_p		FIN_l		FIN_p		FIN_l	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
lnGpc $_{t-1}$	0.921*** [0.017]	0.858*** [0.049]	0.876*** [0.038]	0.884*** [0.032]	0.952*** [0.025]	0.812*** [0.121]	1.067*** [0.152]	1.034*** [0.077]
CR3	0.003 [0.001]	0.327 [0.003]	-0.040 [0.001]	0.088 [0.003]				
CR3SQR		-0.002 [0.000]		-0.001 [0.000]				
LI					0.117 [0.093]	0.130 [0.122]	0.045 [0.083]	-0.270 [0.542]
LISQR						-0.224 [0.159]		0.002 [0.630]
DEV	-0.077 [0.063]	-0.087 [0.101]	-0.101 [0.076]	-0.086 [0.090]	-0.077 [0.053]	-0.562 [0.454]	0.141 [0.374]	0.015 [0.123]
CR3xDEV	-0.001* [0.001]	-0.003*** [0.001]	-0.002*** [0.001]	-0.002*** [0.001]				
LIxDEV					-0.069 [0.093]	0.005 [0.065]	-0.084 [0.126]	0.213 [0.269]
lnFIN_p	0.021 [0.014]	0.040* [0.024]			0.016 [0.019]	0.049 [0.045]		
lnFIN_l			-0.003 [0.023]	-0.010 [0.020]			-0.075 [0.077]	-0.046 [0.046]
lnGCF	0.003 [0.016]	0.014 [0.034]	0.017 [0.030]	0.024 [0.028]	0.022 [0.025]	-0.010 [0.025]	0.013 [0.017]	0.031 [0.046]
lnTO	0.017 [0.012]	0.014 [0.024]	0.047* [0.024]	0.037 [0.023]	0.008 [0.022]	0.055*** [0.021]	0.065** [0.031]	0.041 [0.040]
lnGS	-0.043** [0.020]	-0.074* [0.040]	-0.060** [0.029]	-0.067** [0.026]	-0.040* [0.024]	-0.042 [0.048]	0.025 [0.040]	-0.051 [0.059]
Constant	0.708*** [0.176]	1.129** [0.476]	1.085*** [0.324]	1.025*** [0.334]	0.373* [0.218]	1.561 [1.155]	-0.694 [1.348]	-0.185 [0.610]
$\beta_1 + \beta_3$	-0.001*** [0.000]	0.000 [0.003]	-0.003*** [0.001]	-0.001 [0.003]	0.048 [0.059]	0.135 [0.086]	-0.038 [0.065]	-0.058 [0.388]
Observations	548	548	548	548	461	461	461	461
No. of instruments	36	19	16	20	34	19	13	17
No. of groups	39	39	39	39	37	37	37	37
Arellano-Bond: AR(1)	0.007	0.004	0.002	0.001	0.014	0.034	0.020	0.019
Arellano-Bond: AR(2)	0.228	0.245	0.239	0.234	0.030	0.112	0.110	0.146
Hansen test (p-val)	0.357	0.209	0.238	0.228	0.236	0.070	0.323	0.624

Notes: *(i) Standard errors in brackets, (ii) * p<0.1, ** p<0.05, *** p<0.01.*
lnGpc is the natural log of the real GDP per capita. CR3 is the 3-bank concentration ratio (due to low values; we multiplied the coefficients by 100). CR3SQR is the square term of CR3 (multiplied by 100). LI is the Lerner index. LISQR is the square term of LI. DEV is the dummy variable representing a developing economy. CR3xDEV is the interaction term between CR3 and DEV. LIxDEV is the interaction term between LI and DEV. lnFIN_p is the natural log of the ratio of private credit to GDP. lnFIN_l is the natural log of the ratio of liquid liabilities to GDP. lnGCF is the natural log of the gross capital formation. lnTO is the natural log of trade openness. lnGS is the natural log of the government size.

Based on the results presented in Table 10, diagnostic statistics imply the adequacy of GMM estimations and confirm the validity of instruments used in our estimation models. Most baseline and non-linear coefficients of CR3 and LI are significant. However, corruption (COR) coefficients and their interaction with bank market structure measures (CR3xCOR & LIxCOR) coefficients are all individually insignificant. Nevertheless, the joint significance tests confirm the validity of interaction terms introduction in non-linear Models (2), (4) and (6) in which the interaction terms are insignificant on their own. Thus, in these cases, we can interpret signs of the interaction terms' coefficients which are positive.

For illustration purposes, we will take a few examples. Given that in Model (2) $\beta_1+\beta_3$ = 0.003, we will multiply this number with the lowest, the mean, and the highest corruption value in our dataset. Hence, the lowest control for corruption value was recorded in Afghanistan in 2008, and it was -1.64 indicating the highest degree of corruption. When multiplied by 0.003 we get -0.00492, indicating a decrease in Gpc by about 0.5%. Next, the mean corruption value for our sample is -0.60, and after multiplying it with 0.003, we get -0.0018, showing that on average Gpc would decrease by 0.2%. Finally, the highest value for the control of corruption, i.e. the least corrupted country was Pakistan in 2009, and it was 1.57. In this case, we see that there will be an increase in Gpc by 0.5%.

Overall, the table confirms the significance of the market structure measure of the bank concentration and non–linearity of its relationship with economic growth. Also, joint significance tests suggest that the effect of CR3 and LI on Gpc depends on the level of corruption in these three models.

4.2. Robustness Checks

This section highlights the main results of robustness tests following the same format that we had in the previous subsections. Here, however, we would like to make a few notes. First, in this section, we will report results using three additional measures of the bank concentration. Two of them are the market structure measures – the concentration ratio of the top 5 banks (CR5) and the Herfindahl-Hirschman Index (HHI) – and the third one is the market power measure – the Boone indicator (BI) – as discussed earlier. Second, we will report data using only private credit to GDP ratio (FIN_p) as a proxy for financial development.

4.2.1 Baseline and Non-Linear Models

The baseline and non-linear models for economic growth and bank concentration relationships are presented in Table 11. We will start first with baseline (linear) models (Models 1-2 and 5-6 for CR5 and BI respectively). The diagnostic tests confirm the validity of the instruments used and the adequacy of GMM estimation. The results show that the coefficients for the market structure measure (CR5), although negative, are all insignificant. In contrast, the market power measure (BI) coefficients are negative but significant only in the Model (5). It seems that the impact of the bank market structure on economic growth is not significant, although we found significance between CR3 and Gpc in Table 7. The results, however, show some evidence of the bank market power (BI) impact on economic growth, similar to the findings of Table 7. Interestingly, the impact of financial development is positive, but insignificant in all models. Finally, when it comes to the control variables, the results conform to the findings in Table 7 when it comes to their significance and signs.

When it comes to non-linear models (Models 3-4 and 7-8 for CR5 and BI respectively), we found some evidence earlier about non-linear, the inverted U–shaped, the relationship between bank concentration measures on one side and economic growth on the other (see Table 8). However, using our robustness models, the only non-linear relationship is found in the Model (8) of Table 11 where coefficients for BI and its square term (BISQR) are both significant and positive, contrary to the earlier findings. Based on these results, it seems that an increase in BI increases Gpc, and after it reaches the inflection point (-0.044), it intensifies its positive impact on Gpc significantly. When it comes to financial development proxy and other control variables, then robustness tests indicate similar findings as in the case of linear models reported earlier.

4.2.2 Income and Corruption Level Models

Table 12 reports robustness tests for developing economies (Models 1-2 for CR5 and 5-6 for BI) and corrupted countries (economies (Models 3-4 for CR5 and 7-8 for BI). When it comes to developing countries' models, the results show a positive and significant impact of CR5 only. At the same time, all other linear and non-linear terms for bank market structure/power measures are insignificant. In line with the main results, the interaction terms are significant in Models (1) and (2), but the joint significance test is confirmed only in Model (1). Hence, as with the main results, we find limited evidence that the impact of bank market structure on economic growth differs statistically with a country's income level. In other words, we find some evidence that bank concentration hurts economic growth only in low-income countries. Finally, the results in Table 12 show no evidence of financial development impact on economic growth whatsoever. The same applies to the majority of control variables except for GS that exhibits a negative impact on Gpc – the results that are in line with our main findings.

Table 11: Robustness Checks for Linear and Non-Linear Models

Variables	CR5				BI			
	Linear		Non-Linear		Linear		Non-Linear	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
lnGpc$_{t-1}$	0.960***	0.919***	0.962***	0.885***	0.988***	0.928***	0.987***	0.922***
	[0.012]	[0.027]	[0.012]	[0.046]	[0.010]	[0.015]	[0.010]	[0.014]
CR5	-0.022	-0.112	-0.003	-0.004				
	[0.000]	[0.001]	[0.004]	[0.008]				
CR5SQR			0.002	0.002				
			[0.000]	[0.000]				
BI					-0.123*	-0.072	-0.065	0.572*
					[0.065]	[0.156]	[0.145]	[0.331]
BISQR							0.549	6.426**
							[1.022]	[2.888]
lnFIN_p	0.014	0.000	0.012	0.002	0.003	0.010	0.004	0.013
	[0.009]	[0.018]	[0.010]	[0.028]	[0.011]	[0.015]	[0.011]	[0.016]
lnGCF	0.023	0.030	0.021	0.019	0.036***	0.047*	0.036***	0.046
	[0.016]	[0.034]	[0.013]	[0.046]	[0.013]	[0.028]	[0.013]	[0.030]
lnTO	0.061***	0.082***	0.060***	0.119*	0.017	0.048*	0.017	0.050*
	[0.020]	[0.030]	[0.018]	[0.061]	[0.010]	[0.028]	[0.011]	[0.027]
lnGS	-0.031	-0.016	-0.023	-0.008	-0.025**	-0.034	-0.023**	-0.026
	[0.027]	[0.032]	[0.019]	[0.055]	[0.012]	[0.025]	[0.011]	[0.031]
lnBNI		-0.043**		-0.058		-0.041		-0.050*
		[0.021]		[0.043]		[0.025]		[0.027]
lnBCI		-0.104**		-0.138*		-0.130***		-0.147***
		[0.049]		[0.073]		[0.038]		[0.037]
lnBNIM		-0.047**		-0.069*		-0.046***		-0.053***
		[0.022]		[0.040]		[0.016]		[0.018]
lnINF		0.009*		0.015*		0.010***		0.009***
		[0.005]		[0.008]		[0.003]		[0.003]
C		-0.012		-0.007		-0.008		-0.008
		[0.008]		[0.011]		[0.007]		[0.008]
Constant	0.064	0.974**	0.167	1.411*	-0.018	0.995***	-0.018	1.116***
	[0.094]	[0.403]	[0.153]	[0.756]	[0.050]	[0.319]	[0.044]	[0.321]
Observations	472	400	472	400	521	467	521	467
No. of instruments	34	20	35	20	32	37	33	38
No. of groups	36	36	36	36	39	39	39	39
Arellano-Bond: AR(1)	0.009	0.006	0.010	0.005	0.001	0.001	0.001	0.000
Arellano-Bond: AR(2)	0.318	0.345	0.280	0.258	0.197	0.153	0.194	0.126
Hansen test (p-val)	0.514	0.705	0.531	0.732	0.220	0.641	0.286	0.770

*Notes: (i) Standard errors in brackets, (ii) * p<0.1, ** p<0.05, *** p<0.01.*
lnGpc is the natural log of the real GDP per capita. σ is the income volatility. CR5 is the 5-bank concentration ratio. CR5SQR is the square term of CR5 (multiplied by 100). BI is the Boone indicator. BISQR is the square term of BI. lnFIN_p is the natural log of the ratio of private credit to GDP. lnFIN_l is the natural log of the ratio of liquid liabilities to GDP. lnGCF is the natural log of the gross capital formation. lnTO is the natural log of trade openness. lnGS is the natural log of the government size. lnBNI is the natural log of the bank noninterest income to total income ratio. lnBCI is the natural log of the bank cost to income ratio. lnBNIM is the natural log of the bank net interest margin. lnINF is the natural log of inflation. C is the crisis dummy variable.

Table 12: Robustness Checks for Developing Economies & Corruption Level Models

Variables	CR5				BI			
	Developing		Corruption		Developing		Corruption	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
lnGpc$_{t-1}$	0.884***	0.899***	0.952***	0.952***	0.919***	0.923***	0.863***	0.877***
	[0.036]	[0.041]	[0.019]	[0.018]	[0.020]	[0.024]	[0.111]	[0.061]
CR5	0.002**	-0.005	-0.027	-0.345				
	[0.001]	[0.008]	[0.000]	[0.004]				
CR5SQR		0.004		0.002				
		[0.000]		[0.000]				
BI					0.220	0.360	0.048	0.064
					[0.199]	[0.238]	[0.419]	[0.510]
BISQR						1.554		-0.095
						[2.329]		[3.794]
DEV	0.121	0.089			-0.191***	-0.184***		
	[0.102]	[0.103]			[0.053]	[0.060]		
CR5xDEV	-0.004***	-0.003**						
	[0.001]	[0.002]						
BIxDEV					-0.408	-0.362		
					[0.311]	[0.311]		
COR			0.037	0.032			0.092	0.083
			[0.048]	[0.045]			[0.075]	[0.053]
CR5xCOR			-0.015	-0.008				
			[0.001]	[0.001]				
BIxCOR							-0.073	0.027
							[0.491]	[0.340]
lnFIN_p	0.035	0.021	0.015	0.014	0.026	0.028	0.053	0.057*
	[0.024]	[0.030]	[0.011]	[0.011]	[0.016]	[0.020]	[0.058]	[0.033]
lnGCF	0.035	0.034	0.022	0.024	0.022	0.026	0.105	0.050
	[0.030]	[0.041]	[0.020]	[0.020]	[0.027]	[0.031]	[0.095]	[0.070]
lnTO	0.011	0.015	0.075**	0.074**	0.005	-0.003	0.167	0.148
	[0.020]	[0.029]	[0.032]	[0.029]	[0.019]	[0.021]	[0.130]	[0.096]
lnGS	-0.102**	-0.100**	-0.033	-0.034	-0.065*	-0.059*	-0.097	-0.081
	[0.045]	[0.046]	[0.034]	[0.034]	[0.034]	[0.033]	[0.069]	[0.061]
Constant	0.882***	1.068**	0.100	0.220	0.765***	0.730***	0.196	0.286
	[0.331]	[0.482]	[0.107]	[0.182]	[0.241]	[0.253]	[0.344]	[0.325]
$\beta_1 + \beta_3$	-0.002**	-0.008	-0.000	-0.004	-0.188	-0.002	-0.024	0.091
	[0.001]	[0.008]	[0.001]	[0.004]	[0.200]	[0.321]	[0.739]	[0.657]
Observations	472	472	444	444	521	521	486	486
No. of instruments	20	19	35	36	34	35	14	13
No. of groups	36	36	36	36	39	39	39	39
Arellano-Bond: AR(1)	0.012	0.015	0.013	0.015	0.002	0.002	0.039	0.011
Arellano-Bond: AR(2)	0.579	0.464	0.188	0.164	0.203	0.203	0.108	0.115
Hansen test (p-val)	0.312	0.239	0.491	0.499	0.361	0.284	0.270	0.409

Notes: *(i) Standard errors in brackets, (ii) * p<0.1, ** p<0.05, *** p<0.01.*
lnGpc is the natural log of the real GDP per capita. σ is the income volatility. CR5 is the 5-bank concentration ratio (multiplied by 100). CR5SQR is the square term of CR5 (multiplied by 100). BI is the Boone indicator. BISQR is the square term of BI. DEV is the dummy variable representing developing economies. CR3xDEEV is the interaction term between CR3 and DEV. BIxDEV is the interaction term between BI and DEV. COR is a variable representing a corrupted country. CR5xCOR is the interaction term between CR5 and COR (multiplied by 100). BIxCOR is the interaction term between BI and COR. lnFIN_p is the natural log of the ratio of private credit to GDP. lnFIN_l is the natural log of the ratio of liquid liabilities to GDP. lnGCF is the natural log of the gross capital formation. lnTO is the natural log of trade openness. lnGS is the natural log of the government size.

After low-income countries analysis, we come to the robustness checks and analysis of corrupted–countries model's whereby Models 3-4 and 7-8 of Table 12 report findings for these models using CR5 and BI, respectively. All models are correctly specified as can be seen from diagnostic statistics tests. Results indicate no significance whatsoever for most of the coefficients. All bank market structure/power coefficients, both linear and non–linear terms, are insignificant. This is contrary to the findings previously reported in Table 10, where both linear and non-linear terms are found to be significant. Similarly, corruption (COR) and all interaction terms coefficients are also insignificant. This is further validated by the insignificance of joint significance tests of all models.

5. Conclusion

The present study was designed to determine the effect of bank concentration on economic growth in OIC countries. These findings suggest that in general bank concentration has a mostly negative impact on economic growth. Furthermore, the results show a positive impact of bank concentration on growth at a low level of concentration. However, this positive impact has its limits and becomes negative for the majority of OIC countries due to the high level of bank concentration. Although counterintuitive, the impact of financial development on economic growth is found to be negative using our main independent variables. It was also shown that the impact of bank concentration on economic growth depends on the country's income level.

Nevertheless, it seems that this relationship is not affected by the country's corruption level. Finally, our robustness tests show little support for our findings. In the case of financial development, the robustness tests indicate the opposite, i.e. the positive impact on economic growth.

These findings provide practical implications for all stakeholders. First, the negative impact of bank concentration on economic growth can be decreased by increasing competition in the market. One way would be to open up the market for new entrants in the banking sector. Second, the relationship is non-linear, and the negative impact of the bank market power is dominating. Therefore, the policymakers and regulators need to keep the bank market power levels as low as possible and improve other aspects of socio-economic life. Third, improving overall socio-economic conditions, combined with specific controls of bank concentration, are among the steps that should be taken by policymakers and regulators of developing- and emerging economies within OIC countries. Fourth, it seems that improving overall financial development may be an ineffective policy for improving the economic conditions of OIC countries. Instead, the policymakers should focus directly on curbing bank concentration if they want to achieve better economic growth rates. Fifth, using a single measure could be very misleading, and hence it is up to regulators to consider as many measures as possible. Central banks and other regulators should observe bank-level and market-level data regularly to be able to take precautionary measures toward banks that are gaining higher market power. This could bring about more growth and overall stability to the economies of OIC countries. In short, there is a need for a *case–by–case* approach by regulators and policymakers as *one–size–fits–all* may not be the best solution in this scenario.

This study, as is the case with any other studies, comes with several limitations. At the same time, these limitations are also potential areas for further research on the topic and additional investigations. First, we used the real per capita GDP as a proxy for economic growth. It would be worthwhile investigating whether the data will reveal the same results if alternative proxies are used. For example, we could use annual growth rates of GDP instead of GDP per capita. Alternatively, we could also use the growth rates of various industry sectors and bank-level data instead of aggregates. Second, although we included a few bank-specific and country-specific control variables, alternative proxies could produce better and/or more reliable results on the topic. For example, collecting data on the interest rate that largely were not available for our sample, or alternative measures of bank efficiency and profitability can bring about more relevant information to the results.

References

Abojeib, M. M. (2017). Competition - Stability Relationship in Dual Banking Systems: Islamic Vs. Conventional Banks. (PhD), The International Centre for Education in Islamic Finance (INCEIF), Petaling Jaya.

Abuzayed, B., & Al-Fayoumi, N. (2016). Bank concentration, institutional quality, and economic growth: Empirical evidence from MENA countries. Review of International Business and Strategy, 26(2), 219-231. doi:https://doi.org/10.1108/RIBS-01-2014-0008

Alin, A. M., & Bogdan, C. (2011). How does European banking competition impact financial stability? Paper presented at the 13th International Conference on Finance and Banking.

Arellano, M., & Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. The Review of Economic studies, 58(2), 277-297. doi:https://doi.org/10.2307/2297968

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. Journal of Econometrics, 68(1), 29-51. doi:https://doi.org/10.1016/0304-4076(94)01642-D

Baklouti, N., & Boujelbene, Y. (2016). Impact of government size and corruption on economic growth. 2016, 4(2), 6 %J International Journal of Accounting and Economics Studies. doi:10.14419/ijaes.v4i2.6150

Bardhan, P. (1997). Corruption and Development: A Review of Issues. Journal of Economic Literature, 35(3), 1320-1346.

Beck, T., Degryse, H., & Kneer, C. (2014). Is more finance better? Disentangling intermediation and size effects of financial systems. Journal of Financial Stability, 10, 50– 64.

Beck, T., Demirgüç-Kunt, A., & Maksimovic, V. (2003). Bank Competition, Financing Obstacles, and Access to Credit. Retrieved from Washington, DC: https://openknowledge.worldbank.org/handle/10986/19161 License: CC BY 3.0 IGO

Beck, T., Demirgüç-Kunt, A., & Merrouche, O. (2013). Islamic vs. conventional banking: Business model, efficiency and stability. Journal of Banking & Finance, 37(2), 433-447. doi:https://doi.org/10.1016/j.jbankfin.2012.09.016

Beck, T., & Levine, R. (2004). Stock Markets, Banks, and Growth: Panel Evidence. Journal of Banking and Finance, 28(3), 423-442.

Benczúr, P., Karagiannis, S., & Kvedaras, V. (2019). Finance and economic growth: Financing structure and non-linear impact. Journal of Macroeconomics, 62, 103048. doi:https://doi.org/10.1016/j.jmacro.2018.08.001

Berger, A. N., Klapper, L. F., & Turk-Ariss, R. (2009). Bank Competition and Financial Stability. Journal of Financial Services Research, 35(2), Journal of Financial Services Research. doi:https://doi.org/10.1007/s10693-008-0050-7

Bezemer, D., Grydaki, M., & Zhang, L. (2014). Is financial development bad for growth? Retrieved from https://ideas.repec.org/p/gro/rugsom/14016-gem.html

Black, S. E., & Strahan, P. E. (2002). Entrepreneurship and Bank Credit Availability. The Journal of Finance, 57(6), 2807-2833.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics, 87(1), 115-143. doi:https://doi.org/10.1016/S0304-4076(98)00009-8

Bond, S. R., Hoeffler, A., & Temple, J. (2001). GMM Estimation of Empirical Growth Models. Retrieved from https://EconPapers.repec.org/RePEc:cpr:ceprdp:3048

Boone, J. (2004). A New Way to Measure Competition. Retrieved from

Boone, J. (2008). A New Way to Measure Competition*. The Economic Journal, 118(531), 1245-1261. doi:https://doi.org/10.1111/j.1468-0297.2008.02168.x

Boyd, J. H., Levine, R., & Smith, B. D. (2001). The impact of inflation on financial sector performance. Journal of Monetary Economics, 47(2), 221-248. doi:https://doi.org/10.1016/S0304-3932(01)00049-6

Brambor, T., Clark, W. R., & Golder, M. (2006). Understanding Interaction Models: Improving Empirical Analyses. Political Analysis, 14(1), 63-82.

Carbó, S., Humphrey, D., Maudos, J., & Molyneux, P. (2009). Cross-country comparisons of competition and pricing power in European banking. Journal of International Money and Finance, 28(1), 115-134. doi:https://doi.org/10.1016/j.jimonfin.2008.06.005

Carlin, W., & Mayer, C. (2003). Finance, investment, and growth. Journal of Financial Economics, 69(1), 191-226. doi:https://doi.org/10.1016/S0304-405X(03)00112-0

Cetorelli, N. (2001). Competition among banks: good or bad? Economic Perspectives(Q II), 38-48.

Cetorelli, N., & Gambera, M. (2001). Banking Market Structure, Financial Dependence and Growth: International Evidence from Industry Data. The Journal of Finance, 56(2), 617-648.

Cetorelli, N., & Strahan, P. E. (2006). Finance as a Barrier to Entry: Bank Competition and Industry Structure in Local U.S. Markets. The Journal of Finance, 61(1), 437-461. doi:https://doi.org/10.1111/j.1540-6261.2006.00841.x

Claessens, S., & Laeven, L. (2005). Financial dependence, banking sector competition, and economic growth. Journal of the European Economic Association, 3(1), 179-207. doi:https://doi.org/10.1162/1542476053295322

Coccorese, P. (2009). Market power in local banking monopolies. Journal of Banking & Finance, 33(7), 1196-1210. doi:https://doi.org/10.1016/j.jbankfin.2008.12.013

Compton, R. A., & Giedeman, D. C. (2011). Panel evidence on finance, institutions and economic growth. Applied Economics, 43(25), 3523-3547. doi:https://doi.org/10.1080/00036841003670713

Davis, K. (2007, 20–21 August). Banking Concentration, Financial Stability and Public Policy Paper presented at the The Structure and Resilience of the Financial System, Sydney.

De Guevara, J. F., & Maudos, J. (2011). Banking competition and economic growth: cross-country evidence. The European Journal of Finance, 17(8), 739-764. doi:https://doi.org/10.1080/1351847X.2011.554300

Deesomsak, R., Paudyal, K., & Pescetto, G. (2004). The determinants of capital structure: evidence from the Asia Pacific region. Journal of Multinational Financial Management, 14(4), 387-405. doi:https://doi.org/10.1016/j.mulfin.2004.03.001

Deidda, L., & Fattouh, B. (2005). Concentration in the banking industry and economic growth. Macroeconomic Dynamics, 9(2), 198-219. doi:https://doi.org/10.1017/S1365100505040174

Demirgüç-Kunt, A., & Detragiache, E. (1998). The Determinants of Banking Crises in Developing and Developed Countries. Staff Papers (International Monetary Fund), 45(1), 81-109. doi:https://doi.org/10.2307/3867330

Demirgüç-Kunt, A., & Detragiache, E. (2002). Does deposit insurance increase banking system stability? An empirical investigation. Journal of Monetary Economics, 49(7), 1373-1406. doi:https://doi.org/10.1016/S0304-3932(02)00171-X

Dewatripont, M., & Maskin, E. (1995). Credit and Efficiency in Centralized and Decentralized Economies. The Review of Economic studies, 62(4), 541-555. doi:https://doi.org/10.2307/2298076

Di Patti, E. B., & Dell'Ariccia, G. (2004). Bank Competition and Firm Creation. Journal of Money, Credit and Banking, 36(2), 225-251.

Diallo, B., & Koch, W. (2017). Bank Concentration and Schumpeterian Growth: Theory and International Evidence. The Review of Economics and Statistics, 0(ja). doi:https://doi.org/10.1162/REST_a_00679

Dollar, D. (1992). Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence from 95 LDCs, 1976-1985. Economic Development and Cultural Change, 40(3), 523-544.

Dollar, D., & Kraay, A. (2004). Trade, Growth, and Poverty. The Economic Journal, 114(493), F22-F49. doi:https://doi.org/10.1111/j.0013-0133.2004.00186.x

Fernández, A. I., González, F., & Suárez, N. (2010). How institutions and regulation shape the influence of bank concentration on economic growth: International evidence. International Review of Law and Economics, 30(1), 28-36. doi:https://doi.org/10.1016/j.irle.2009.09.001

Fernández, R. O., & Garza-García, J. G. (2015). The relationship between bank competition and financial stability: a case study of the Mexican banking industry. Ensayos Revista de Economia, 34(1), 103-120.

Ferreira, C. n. (2012). Bank efficiency, market concentration and economic growth in the European Union. WP 38/2012/DE/UECE, 1-36. http://pascal.iseg.utl.pt/~depeco/wp/wp382012.pdf

Fisman, R., & Raturi, M. (2004). Does Competition Encourage Credit Provision? Evidence from African Trade Credit Relationships. The Review of Economics and Statistics, 86(1), 345–352.

Fu, X., Lin, Y., & Molyneux, P. (2014). Bank competition and financial stability in Asia Pacific. Journal of Banking & Finance, 38, 64-77. doi:https://doi.org/10.1016/j.jbankfin.2013.09.012

Ghasemi, A., & Abdolshah, F. (2014). The Survey of the Causal Relationship between Banking Concentration and Economic Growth. Iranian Economic Review, 18(3), 87-101. doi:https://doi.org/10.22059/ier.2015.54808

Guzman, M. G. (2000). The Economic Impact of Bank Structure: A Review of Recent Literature Economic and Financial Review, Second Quarter, 11-25. https://www.dallasfed.org/~/media/documents/research/efr/2000/efr0002b.pdf

Hannan, T. H. (1991). Bank commercial loan markets and the role of market structure: evidence from surveys of commercial lending. Journal of Banking & Finance, 15(1), 133-149. doi:https://doi.org/10.1016/0378-4266(91)90042-K

Hansen, L. P. (1982). Large Sample Properties of Generalized Method of Moments Estimators. Econometrica, 50(4), 1029-1054. doi:https://doi.org/10.2307/1912775

Holtz-Eakin, D., Newey, W., & Rosen, H. S. (1988). Estimating Vector Autoregressions with Panel Data. Econometrica, 56(6), 1371-1395. doi:https://doi.org/10.2307/1913103

Hsiao, C. (2007). Panel data analysis—advantages and challenges. TEST, 16(1), 1-22. doi:https://doi.org/10.1007/s11749-007-0046-x

Islam, N. (1995). Growth Empirics: A Panel Data Approach. The Quarterly Journal of Economics, 110(4), 1127-1170. doi:https://doi.org/10.2307/2946651

Ito, H. (2006). Financial development and financial liberalization in Asia: Thresholds, institutions and the sequence of liberalization. The North American Journal of Economics and Finance, 17(3), 303-327. doi:https://doi.org/10.1016/j.najef.2006.06.008

Jackson, J. E., & Thomas, A. R. (1995). Bank structure and new business creation lessons from an earlier time. Regional Science and Urban Economics, 25(3), 323-353.

Law, S. H., & Singh, N. (2014). Does too much finance harm economic growth? Journal of Banking & Finance, 41, 36-44. doi:https://doi.org/10.1016/j.jbankfin.2013.12.020

Lee, C.-C., & Hsieh, M.-F. (2013a). Beyond Bank Competition and Profitability: Can Moral Hazard Tell Us More? Journal of Financial Services Research, 44(1), 87-109. doi:10.1007/s10693-012-0151-1

Lee, C.-C., & Hsieh, M.-F. (2013b). The impact of bank capital on profitability and risk in Asian banking. Journal of International Money and Finance, 32(Supplement C), 251-281. doi:https://doi.org/10.1016/j.jimonfin.2012.04.013

Leff, N. H. (1964). Economic Development Through Bureaucratic Corruption. American Behavioral Scientist, 8(3), 8-14. doi:https://doi.org/10.1177/000276426400800303

Lerner, A. P. (1934). The Concept of Monopoly and the Measurement of Monopoly Power. The Review of Economic studies, 1(3), 157-175. doi:https://doi.org/10.2307/2967480

Levine, R., & Renelt, D. (1992). A Sensitivity Analysis of Cross-Country Growth Regressions. The American Economic Review, 82(4), 942-963.

Ma, Y., & Song, K. (2017). Financial Development and Macroeconomic Volatility. Bulletin of Economic Research, 0(0). doi:https://doi.org/10.1111/boer.12123

Maudos, J., & de Guevara, F. J. (2006). Banking competition, financial dependence and economic growth. Published in: Documentos de Trabajo, Fundación de las Cajas de Ahorros (2006). Munich Personal RePEc Archive (MPRA), Paper no. 15254. http://mpra.ub.uni-muenchen.de/15254/

Mlachila, M., Park, S. G., & Yabara, M. (2013). Banking in Sub-Saharan Africa: The Macroeconomic Context. Washington, D.C.: International Monetary Fund.

Moyo, J., Nandwa, B., Oduor, J., & Simpasa, A. (2014). Financial Sector Reforms, Competition and Banking System Stability in Sub-Saharan Africa. Paper presented at the Macroeconomic Challenges Facing Low-Income Countries: New Perspectives, Washington, DC.

Naceur, S. B., Blotevogel, R., Fischer, M., & Shi, H. (2017). Financial Development and Source of Growth: New Evidence. IMF Working Paper, WP/17/143.

Nyasha, S., & Odhiambo, N. M. (2019). Government Size and Economic Growth: A Review of International Literature. 9(3), 2158244019877200. doi:10.1177/2158244019877200

Petersen, M. A., & Rajan, R. G. (1995). The Effect of Credit Market Competition on Lending Relationships. The Quarterly Journal of Economics, 110(2), 407-443. doi:https://doi.org/10.2307/2118445

Rajan, R. G., & Zingales, L. (2001). Financial Systems, Industrial Structure, and Growth. Oxford Review of Economic Policy, 17(4), 467-482. doi:https://doi.org/10.1093/oxrep/17.4.467

Repkova, I. (2012). Market power in the Czech banking sector. Journal of Competitiveness, 4(1), 143–155. doi:https://doi.org/10.7441/joc.2012.01.11

Robinson, M. (1998). Corruption and development: An introduction. The European Journal of Development Research, 10(1), 1-14. doi:https://doi.org/10.1080/09578819808426699

Roodman, D. (2009a). How to do xtabond2: An introduction to difference and system GMM in Stata. Stata Journal, 9(1), 86-136.

Roodman, D. (2009b). A Note on the Theme of Too Many Instruments. Oxford Bulletin of Economics and Statistics, 71(1), 135-158. doi:https://doi.org/10.1111/j.1468-0084.2008.00542.x

Samargandi, N., Fidrmuc, J., & Ghosh, S. (2015). Is the Relationship Between Financial Development and Economic Growth Monotonic? Evidence from a Sample of Middle-Income Countries. World Development, 68, 66-81. doi:https://doi.org/10.1016/j.worlddev.2014.11.010

Shaffer, S. (1998). The Winner's Curse in Banking. Journal of Financial Intermediation, 7(4), 359-392. doi:https://doi.org/10.1006/jfin.1998.0251

Sheehey, E. J. (1993). The Effect of Government Size on Economic Growth. Eastern Economic Journal, 19(3), 321-328.

Shen, C.-H., & Lee, C.-C. (2006). Same financial development yet different economic growth – why? Journal of Money, Credit, and Banking, 38(7), 1907-1944.

Soedarmono, W. (2010). Bank competition, institution and economic development: Evidence from Asia during 1999-2007. Economics Bulletin, 30(3), 2119-2133.

Stiglitz, J. E., & Weiss, A. (1981). Credit Rationing in Markets with Imperfect Information. The American Economic Review, 71(3), 393-410.

Van Leuvensteijn, M., Bikker, J. A., Van Rixtel, A. A. R. J. M., & Sørensen, C. K. (2011). A new approach to measuring competition in the loan markets of the euro area. Applied Economics, 43(23), 3155-3167. doi:https://doi.org/10.1080/00036840903493234

Voskanyan, F. (2000). A study of the effects of corruption on economic and political development of Armenia. (Master Thesis), American University of Armenia, Yerevan, Armenia.

Zsohar, P. (2012). Short Introduction to the Generalized Method of Moments. Hungarian Statistical Review, Special Number 16, 151-170.

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