

## **Bank Competition and Economic Growth: A Cross-Country Investigation**

**Sanhapas Laowattanabhongse<sup>a\*</sup> and Sorasart Sukcharoensin<sup>b</sup>**

*<sup>a,b</sup>School of Development Economics,  
National Institute of Development Administration, Thailand*

*\*Corresponding author*

### **Abstract**

The relationship between bank competition and economic growth is still a controversial issue. There are two opposing hypotheses: more-competition-less-growth and more-competition-more-growth. This paper, therefore, attempts to conclude the relationship under the competition-growth nexus by using a sample of 81 countries covering both developed and developing countries during the years 2000 to 2013. The empirical results reveal that two main measures for bank competition, specifically market pricing power and market concentration, indeed have opposite effects on economic growth. In addition, given the same level of competition, the economic growth tends to be higher in countries with lower level of accessibility to bank funding, lower credit to the private sector and a more efficient banking system. These findings have significant policy implications to analyse the effect of competition in the financial sector on economic growth.

**Keywords:** Bank Competition, Economic Growth, Concentration, Accessibility, Efficiency

**JEL Classification:** G21

## 1. Introduction

Bank competition has long been recognized as having an impact on economic growth. However, existing theoretical frameworks still provide an inconclusive relationship between them. This topic is still a controversial issue between researchers. On one side, the view of more-competition-less-growth, according to Rajan (1992), suggests that more competitive banking industries will provide less amount of loans issued to firms because they have less incentive to invest in close relationships with them. As a result, firms that heavily rely on external financing should grow slowly. On the opposite side, the view of more-competition- more-growth, according to Boot and Thakor (2000), suggests that more competitive banking industries will provide more loans to firms because they need to compete more with each other. As a result, firms that heavily rely on external financing should grow faster. This paper will, therefore, contribute to the existing literature gap by investigating the linkage under the competition-growth nexus by proposing an empirical model that can explain the variation of economic growth in 81 countries throughout the globe during the period 2000 to 2013.

The remains of this paper is structured as followings. The next section summarizes the existing literature, which will be followed by data and methodology. Then, the empirical results are discussed, and the last section concludes our findings with recommendation.

## 2. Literature Reviews

There are two main subsections describing the evolution of research on bank competition and economic growth, starting from the very early stage on how to determine the level of bank competition. Then, the studies on the relationship between bank competition and economic growth are reviewed in the subsequent section.

### 2.1 Degree of Competition Measurement

As competition cannot be measured directly, academicians need to find an appropriate proxy to quantify it. The research on the degree of bank competition has been developed in two major streams called the structural and non-structural approaches.

The structural approach focuses mainly on the Structure Conduct Performance (SCP) framework and the efficiency hypothesis. The SCP framework explores whether a highly concentrated market will result in a superior industry performance through the collusive behavior among larger banks or not. Bain (1951) states that when the market concentration increases, the prices usually increase, and firms have positive normal profits. However, Smirlock (1985) and Evanoff and Fortier (1988) argues that higher profits in concentrated markets can be the result of greater productivity. The market structure can be measured by, for example, k-bank concentration index.

The non-structural approach, on the other hand, focuses mainly on the factors other than market structure and concentration that can affect the competitive behavior of the banks, such as general contestability of the market, barrier to entry and so on. While the structural approach focuses on the structure of the market (i.e. concentration index) and relates this to the conduct (i.e. pricing policy) and performance of the banks (i.e. return of asset, return of equity), the non-structural approach does not attempt to do so. Therefore, as documented by Goddard, Molyneux and Wilson (2001), the most important advantage of non-structural approach is probably that it does not presume that the concentrated markets are, in general, not competitive. That is because contestability may depend on the competitive environment and not solely on the market structure.

There are two distinctive traditional models for non-structural approach that have been constructed, which are the model of Bresnahan (1989) and Panzar and Rosse (1987). The model of Bresnahan (1989) uses the condition of general market equilibrium. The basic concept is that profit-maximizing firm in equilibrium will choose prices and quantities such that marginal cost equal to their marginal revenue. The test statistic estimated from this model is quite simple to interpret as it provides a direct relationship to a natural measure of excess capacity. The alternative empirical model is developed by Panzar and Rosse (1987). This model investigates a change in factor input prices in response to a change in equilibrium revenue earned. More recently, there is another competition measurement constructed under non-structural approach, called Lerner index. This index directly measures market pricing power, and it is calculated by taking the difference between price of the output

and the marginal cost then dividing by the price. The interpretation of this index is that when there is no mark-up, it means the market is very competitive. On the contrary, when the mark-up is higher, it means the market is less competitive. One of the main advantages of this index is that it measures the degree of bank competition at bank level.

For empirical studies, there are several papers that investigate the degree of bank competition. Back to late 1980s, Shaffer (1989) adopts Bresnahan's model and finds the result that strongly rejects collusive behavior in the U.S. banking industry during the period 1965 to 1987. By applying the same methodology to the Canadian banking industry during the year 1965 to 1989, Shaffer (1993) later concludes that such market is competitive even though the concentration level is very high. By adopting Panzar and Rosse's model, Shaffer (1982) finds that banking industry in New York is under monopolistic competition during the year 1979. Nathan and Neave (1989) investigate Canadian banking industry and find the consistent result with that of Shaffer (1989). There are also several research papers, including Molyneux, Lloyd-Williams and Thornton (1994), Bikker and Groenevald (2000) and De Bandt and Davis (2000), that apply the Panzar and Rosse's model to the European banking industry. In general, the results reject both perfect competition as well as monopoly. They mostly find the supporting evidence of monopolistic competition.

More recently, Bikker and Spierdijk (2008) study the level of competition using the sample of 101 countries during the period 1986 to 2004. They find that the level of competition is declining for developed countries and increasing for developing countries. By using the same methodology, Turk-Ariss (2009) investigates the level of competition in 12

Middle East and North African countries. He concludes that the level of competition is under monopoly for North African countries and under monopolistic competition for the others.

In summary, there are two measures of competition. Under the structural approach, it measures competition by using the market concentration. On the contrary, under the non-structural approach, it measures competition by using the market pricing power.

## **2.2 Competition and Economic Growth**

The relationship between bank competition and economic growth is still ambiguous among researchers due to the complexity in the computation of competition measurement.

Also, there are two schools of thoughts pertaining to the linkage between bank competition and economic growth. On one side, according to Rajan (1992), it is suggested that more competitive banking industry will result in lower economic growth as banks have less incentive to provide loan to firms. On the opposite side, according to Boot and Thakor (2000), it is suggested that more competitive banking industry will result in higher economic growth as banks have more incentive to provide loan to firms.

The empirical evidence in this area is still unclear about the true relationship between the competition in banking sector and economic growth, and there are still limited numbers of cross-country investigation on this topic. Among a few of them, Cetorelli and Gambera (2001) perform an empirical investigation and document that bank competition (as measured by market concentration) has a negative effect on overall economic growth. By using similar data and methodology, Deidda and Fattouh (2002) also find that bank competition (as measured by market concentration) has a negative effect on per capita growth in low-income countries even though there is no significant relationship in high-income countries.

Calderon and Liu (2003) investigate the relationship between financial sector development and industrial growth. Their 109 sample countries cover both developed and developing countries during the year 1960 to 1994. They find that there is a positive relationship between financial sector development and industrial growth for most of the countries. Claessens and Laeven (2005) study the relationship between bank competition and economic growth. They first estimate the measure of market competition, using the Panzar- Rosse's approach. Then, they relate this estimated measure to the economic growth. By employing the sample size that includes 16 countries during the year 1994 to 2001, they conclude that greater bank competition allows financially dependent industries to grow faster.

Soedarmono (2010) studies the relationship between bank competition and economic growth using a sample of 17 Asian countries during the period 1999 to 2007. He finds that generally bank competition (as measured by market power) has a U-shaped relationship with economic growth, but such competition tends to have a positive effect on economic growth over time. Also, Asante, Agyapong and Anokye (2011) perform the research on the relationship between bank competition, stock market development and economic growth in Ghana during the period 1992 to 2009. After adopting Granger Causality test, ARDL model and OLS technique, they find that bank competition and stock market development is the cause of economic growth in Ghana during the sampling periods. Eventually, they conclude that bank competition is favorable for economic growth in Ghana in the long run.

Recently, Ajisafe and Ajide (2014) carry out a research on bank competition and economic growth in Nigeria during the period 1986 to 2012 using Vector Error Correction (VEC) model and the co-integration test. They find that bank competition has a first order positive effect on economic growth both in the short run and in the long run. Therefore, they eventually suggest that increasing the competitive environment of the banking sector will lead to an increase in economic growth.

As stated by the above empirical findings, it can be confirmed that the relationship between bank competition and economic growth exist. However, there has not yet been adduced to conclude the effect of bank competition to economic growth due to the complexity of competition measurements and samplings used in the analysis.

### **3. Data and Variable Specification**

This paper uses both micro bank-level and macro country-level data during the period 2000 to 2013. The micro bank-level data is taken from Bankscope database. All data are reported in USD currency and are expressed in constant prices where appropriate. The sample is limited to the commercial banks, and the countries that have banks less than ten banks in the industry are excluded. Also, in order to align the analysis at country level, bank-level data are aggregated into country level. The macro country-level data is mainly obtained from the latest update of the World Development Indicators Database

(WDID) and Global Financial Development Database (GFDD) from the World Bank.

The variables used in this paper can be categorized into six main groups. The first one is the competition measurement under the structural approach or market concentration. The proxy under this category is the concentration index. The second one is the competition measurement under the non-structural approach or market pricing power. The proxy under this category is the Lerner index. The third one is the economic growth measure. The bank-specific control variables, such as efficiency, revenue diversification, portfolio risk and bank size, are contained in the fourth group. The fifth one includes country-specific control variables, and the last one includes the variables reflecting different market characteristics. This group is later used to construct dummy variables.

### 3.1 Structural Competition Measure

The component of the concentration measure is based mainly on the number of banks and the distribution of banks in a certain market. The general form of the Concentration Index (denoted as CI hereafter) can be illustrated as following.

$$CI_t = \sum_i^n s_{it} w_{it} \quad (1)$$

where:

$s_{it}$  is the market share of bank  $i$  at time  $t$ .

$w_{it}$  is the weight that the index attaches to the corresponding market share.

$n$  is the number of banks in the market under consideration.

The weights attached to the individual market shares determine the sensitivity of the indices towards changes in the shape of the bank distribution. By summing the market shares of the  $k$  largest banks in the market, the  $k$ -bank concentration index can be constructed as following.

$$CI_{kt} = \sum_{i=1}^k s_{it} \quad (2)$$

Even though there is no specific rule to determine the optimal number of  $k$ , in order to align with other existing literatures, such as Bikker and Haaf (2000), Claessens and Laeven (2004) and so on,  $k=5$  is arbitrarily applied in this paper (denoted as CI5 hereafter). The index is in a range between zero and one, and it can be interpreted as following. If it is equal to one, it means that the banks included in the computation make up the entire industry. As a result, the competition is at the lowest in this case. On the other hand, if it approaches zero, it means that there exists the infinite number of very small banks in the market given that the  $k$  chosen banks for the computation is relatively small comparing to the total number of banks. As a result, the competition is at the highest in this case.

### 3.2 Non-Structural Competition Measure

The Lerner Index (denoted as LI hereafter) provides a direct measure of the degree of market power as it represents the mark-up of price over marginal cost. It is calculated by taking the difference between price of the output and the marginal cost that produces such output and then dividing by the price. The interpretation of this index is that when there is no mark-up (LI = zero), it means the market is very competitive. When LI is higher, it means lower market power. As a result, the competition is higher. LI can be computed as following.

$$LI_t = \frac{P_{it} - MC_{it}}{P_{it}} \tag{3}$$

where:

$P_{it}$  is the price of each bank  $i$  at time  $t$ , which is calculated by the number of total revenue divided by total asset.

$MC_{it}$  is the marginal cost of each bank  $i$  at time  $t$ , which is derived from a translog cost function that includes three costs and control variables as in equation 4.

$$\ln TC_{i,t} = \alpha_0 + \alpha_1 \ln TA_{it} + \alpha_2 (\ln TA_{it})^2 + \sum_{j=1}^3 \beta_j \ln w_{it}^j + \sum_{j=1}^3 \sum_{k=1}^3 \beta_{jk} \ln w_{it}^j \ln w_{it}^k + \sum_{j=1}^3 \gamma_j \ln w_{it}^j \times \ln TA_{it} + \varepsilon_{it} \tag{4}$$

where:

$TC_{it}$  is the total cost of each bank  $i$  at time  $t$ .

$w_{it}$  is the price of three inputs, which are deposit fund, labor and fixed asset.

$w_{it}^1$  is the price of deposit, which is the ratio of interest expense to total deposit.

$w_{it}^2$  is the price of labor, which is the ratio of personal expense to total asset.

$w_{it}^3$  is the price of fixed asset, which is the ratio of operating expense to fixed asset.

$TA_{it}$  is the total asset.

### 3.3 Economic Growth Measure

The rate of real GDP growth (denoted as GDPG hereafter) is used as a proxy for dependent variable. It reflects general economic development, macroeconomic stability and institutional framework as these are likely to affect banking system performance in a country.

### 3.4 Bank-Specific Control Variables

This group contains five main variables. The first one is Cost to Income Ratio (denoted as CIR hereafter) is one of the most popular efficiency measurements of the bank. It is calculated as total cost over total income. So, it measures how well the expense is utilized per one unit of revenue. The higher the ratio is, the less efficient the bank becomes.

The second one is Revenue Diversification Index (denoted as RDI hereafter) is calculated by using Hirschman Herfindahl approach for each bank. It accounts for the diversification between interest and non-interest income. The higher RDI ratio means higher revenue concentration and hence lower revenue diversification.

$$RDI_{it} = \left( \frac{NII_{it}}{TR_{it}} \right)^2 + \left( \frac{FI_{it}}{TR_{it}} \right)^2 + \left( \frac{TI_{it}}{TR_{it}} \right)^2 \quad (5)$$

where:

$TR_{it}$  is the total revenue of each bank  $i$  at time  $t$ .

$NI_{it}$  is the net interest income of each bank  $i$  at time  $t$ .

$FI_{it}$  is the fee income of each bank  $i$  at time  $t$ .

$TI_{it}$  is the trading income of each bank  $i$  at time  $t$ .

The third one is Non-Performing Loan ratio (denoted as NPL hereafter) is used to proxy for loan portfolio risk. It can be computed as NPL over total loan, and the higher ratio means higher portfolio risk. The fourth one is the bank size, which is the total asset held by each bank. The variable is presented in logarithmic form (denoted as LNTA hereafter). The last one is the Bank Account per 1,000 Adults, which is the percentage of population having banking accounts per 1,000 adult (denoted as BAPA hereafter).

### 3.5 Country-Specific Control Variables

This group contains three main variables. The first one is the inflation rate. Usually, lower and more stable inflation can result in the reduction of economic uncertainty the enhancement of price mechanism efficiency, which eventually can lead to more growth. This factor is represented by Consumer Price Index (denoted as CPI hereafter). The second one is the education level of population, which can have a positive effect to the human capital. This factor can be represented by the proportion of school enrollment (denoted as EDU hereafter). The third one is research and development. The expenditure on R&D can be considered as one form of investment that can subsequently transfer to technology. There seems to be a consensus among researchers that higher research and development expenditure is normally associated with higher growth, given other things constant. This factor can be represented by the proportion of R&D expenditure over GDP (denoted as RDEX hereafter).

### 3.6 Control Variables to Construct Dummy Variables

In order to investigate whether the level of economic growth is the same in different market characteristics or not, given the same competition level, dummy variables are constructed. There are four different dimensions to be explored.

The first one is the accessibility to the funding via banking industry. The proxy for this accessibility dimension is the percentage of firms using banks to finance working capital (short-term) and investment (long-term). For the short-term dimension, it is represented by the Proportion of Firms using Banks to Finance Working Capital (denoted as FBFW hereafter). The dummy variable is constructed by separating the high value of FBFW, specifically top 25%. In other word, dummy variable is equal to one if FBFW is in the top 25% of total sampling. This dummy variable is denoted as FBFWH. For the long-term dimension, it is represented by the Proportion of Firms using Banks to Finance Investment (denoted as FBFI hereafter), and the dummy variable is denoted as FBFIH.

The second dimension to be explored is the size of financial market relative to GDP. This dimension can be represented by the ratio of credit to private sector over GDP (denoted as CPSR hereafter). The dummy variable is constructed by separating the high value of CPSR, specifically top 25%. In other word, dummy variable is equal to one if CPSR is in the top 25% of total sampling. This dummy variable is denoted as CPSRH.

The third dimension is stability, which can be represented by the logarithmic form of Z-score index (denoted as LNZI hereafter). It assesses the overall stability at the bank level and combines the indicators of profitability, leverage and return volatility into one variable. Mathematically, it measures the number of standard deviation that a bank's profit must fall to drive it into insolvency. The index potentially measures the accounting distance to default for a given institution, and it is calculated as following.

$$LNZI_{it} = Ln \left( \frac{ROA_{it} + ETA_{it}}{SD(ROA)_{it}} \right) \quad (6)$$

where:

$ROA_{it}$  is the 1-year average return on asset of each bank i at time t.

$ETA_{it}$  is the 1-year average of equity over total asset of each bank i at time t.

$SD(ROA)_{it}$  is the standard deviation of ROA from 3-year rolling period.

The interpretation of LNZI is that the higher LNZI, the lower probability of insolvency risk. The dummy variable is constructed by separating the high value of LNZI, specifically top 25%. In other word, dummy variable is equal to one if LNZI is in the top 25% of total sampling. This dummy variable is denoted as LNZIH.

The last dimension is efficiency, which can be represented by the Return on Asset (denoted as ROA hereafter). The higher the ratio is, the more efficient the financial market is. The dummy variable is constructed by separating the high value of ROA, specifically top 25%. In other word, dummy variable is equal to one if ROA is in the top 25% of total sampling. This dummy variable is denoted as ROAH.

#### 4. Methodology

The theoretical framework pertaining to the relationship between bank competition and industrial growth is originally from the Solow Growth model, which can be written as following.

$$Y = AK^\alpha L^{1-\alpha} \quad (7)$$

where:

$Y$  is total production output.

$A$  is technology given in the economy.

$K$  is total capital generated from financial industry.

$L$  is total labor.

$\alpha$  is restricted to be between 0 and 1.

By assuming  $\alpha = 1$ , equation 7 becomes as following.

$$Y = AK \quad (8)$$

After incorporating bank competition variable and other control variables into equation 8, the baseline equation can be rewritten as in equation 9. In principle, industrial growth is a function of bank competition and a series of bank-specific and country-specific control variables.

$$Growth = f(Competition, BankControls, CountryControls) \quad (9)$$

The empirical model can be illustrated as following.

$$G_{it} = \beta_0 + \beta_1 C_{it} + \sum_{j=2}^k \beta_j X_{ij} + \varepsilon_{it} \quad (10)$$

Finally, in order to investigate whether the level of economic growth is the same in different market characteristics or not, given the competition level constant, the dummy variable is added into the empirical models as following.

$$G_{it} = \beta_0 + \beta_1 C_{it} + \sum_{j=2}^k \beta_j X_{ij} + D + \varepsilon_{it} \quad (11)$$

where:

$G_{it}$  is a measure for economic growth of each country  $i$  at time  $t$ .

$C_{it}$  is a measure for bank competition of each country  $i$  at time  $t$ .

$X_{ij}$  is a set of bank-specific and country-specific control variables.

$D$  is a set of dummy variables.

In order to align with previous literature, fixed effect panel regression technique is adopted to analyse the cross-country information. Panel unit root test and redundant fixed effect test have also been performed to ensure the suitability of the technique used for a given information (not presented herewith).

## 5. Results and Discussion

Table 1 presents the summary of fixed effect panel regression results from standard models with economic growth as a dependent variable and various competition measures as an independent variable together with other bank-specific control variables. Model P11 uses LI as a competition representative, and its coefficient is positive and statistically different from zero. This can be interpreted that higher economic growth is associated with higher market pricing power or lower contestability in the banking market.

The finding from this empirical result is, therefore, supports the view of more- competition-less-growth. In other words, when banks have more market pricing power (less competition), they have more incentive to lend more money to firms because they know that they can generate more profits from these clients. As a result, when firms receive funding from banks, they

**Table 1.** Regression Results from Standard Models

<b>Model</b>	<b>P11</b>	<b>P12</b>	<b>P13</b>
<b>C</b>	0.0789*** (0.0099)	0.1224*** (0.0105)	0.0918*** (0.0119)
<b>LI</b>	0.0485*** (0.0093)		0.0484*** (0.0093)
<b>CI5</b>		-0.0155* (0.0081)	-0.0152* (0.0080)
<b>CIR</b>	-0.0121 (0.0096)	-0.0344*** (0.0086)	-0.0118 (0.0095)
<b>RDI</b>	-0.0397*** (0.0110)	-0.0496*** (0.0110)	-0.0403*** (0.0110)
<b>NPL</b>	-0.0483*** (0.0185)	-0.0733*** (0.0183)	-0.0510*** (0.0186)
<b>LNTA</b>	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
<b>BAPA</b>	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
<b>CPI</b>	-0.0080 (0.0092)	-0.0017 (0.0092)	-0.0080 (0.0092)
<b>EDU</b>	0.0178*** (0.0027)	0.0171*** (0.0027)	0.0178*** (0.0027)
<b>RDEX</b>	1.0879*** (0.1285)	1.0985*** (0.1300)	1.0808*** (0.1284)
<b>R-squared</b>	0.3819	0.3674	0.3841
<b>Adj. R-squared</b>	0.3684	0.3536	0.3700
<b>F-stat</b>	28.2252	26.5310	27.2275
<b>F-stat (prob.)</b>	0.0000	0.0000	0.0000
<b>AIC</b>	-3.9946	-3.9681	-3.9963
<b>SIC</b>	-3.8842	-3.8577	-3.8811

Standard errors are in parentheses. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5% and 1% levels.

can deliver more goods and services. This will later foster economic growth as a whole. Besides competition measure, other independent variables, namely CIR and RDI, also statistically different in model P11. Negative coefficient of CIR can be intuitively interpreted that when the banking industry becomes more efficient, it will be associated with higher economic growth. This can be explained by the fact that when banks are more efficient, it implies that they serve their clients better given certain costs. Likewise, negative coefficient of RDI can be interpreted that when banks diversify their sources of revenue, it usually associated with higher economic growth.

Model P12 uses CI5 as a competition representative. The result shows that the coefficient of CI5 is negative and statistically different from zero, which implies that when banking industry is more concentrated (less competition), it is associated with lower economic growth. Hence, it supports the view of more-competition-more-growth. In other words, when there are many banks in the industry, they need to compete with each other to provide more loan to firms. Therefore, it is easier for firms to get funding and expand their businesses.

Another striking result from model P11 and P12 is that the coefficients from non- structural competition measure (LI) and structural competition measures (CI5) are in the opposite direction. When using market pricing power (LI), the result supports more- competition-less-growth hypothesis. On the contrary, when using market concentration (CI5), the result supports more-competition-more-growth hypothesis. The opposite result of non-structural and structural competition measures can be partially explained by the fact that these measures represent competition in two different angles. On one side, the structural approach or market concentration, considers solely the concentration of the market. On the other side, the non-structural approach or market pricing power, considers the pricing power of banks in the market. Therefore, it is possible that when the market becomes more concentrated, the pricing power does not necessarily increase. As a result, it is possible that the effect from increasing market pricing power and increasing market concentration can have impacts in opposite ways.

In order to confirm the above findings, model P13 includes both market pricing power and market concentration into one single model. The

empirical results are still the same as those from model P11 and P12 with slightly better Adjusted R-square.

Table 2 explores another level of competition-growth nexus by investigating whether the level of economic growth is the same in different market characteristics or not, given the competition level constant. Dummy variables are constructed to separate different market characteristic in four different dimensions, which are (1) accessibility, (2) size of credit offered by financial sector to private sector, (3) stability and (4) efficiency.

The result of the first dimension is presented in model D11 and D12. In model D11, the short-term accessibility is studied by using the variable FBFWH. The coefficient of the main independent variables, such as LI, CI5, CIR, RDI, NPL and LNNTA, is still the same as in the simple model. The new finding from this augmented model is that the coefficient of dummy variable FBFWH is negative and statistically different from zero. This can be interpreted that by holding the other factors constant, the level of economic growth is higher in countries with lower accessibility to short-term funding. Likewise, in model D12, the coefficient of dummy variable FBFH is negative and statistically different from zero. This can be interpreted that by holding the other factors constant, the level of economic growth is also higher in countries with lower accessibility to long-term funding.

The result of the second dimension is presented in model D13. In this model, the size of credit offered by financial sector to private sector is studied by the variable CPSRH. The result shows that the coefficient of dummy variable CPSRH is negative and statistically different from zero. This can be interpreted that by holding the other factors constant, the level of economic growth is higher in countries with smaller size of credit offered by financial sector to private sector.

The result of the third dimension is presented in model D14. In this model, the stability of financial sector is studied by the variable LNZZH. The result shows that the coefficient of dummy variable LNZZH is not statistically different from zero. So, it can be concluded that the level of economic growth is the same across countries with different stability levels.

**Table 2.** Regression Results from Augmented Models

<b>MODEL</b>	<b>D11</b>	<b>D12</b>	<b>D13</b>	<b>D14</b>	<b>D15</b>
<b>MARKET POWER</b>	<b>LI</b>	<b>LI</b>	<b>LI</b>	<b>LI</b>	<b>LI</b>
<b>CONCENTRATION</b>	<b>CI5</b>	<b>CI5</b>	<b>CI5</b>	<b>CI5</b>	<b>CI5</b>
<b>DUMMY</b>	<b>FBFWH</b>	<b>FBFIH</b>	<b>CPSRH</b>	<b>LNZIH</b>	<b>ROAH</b>
<b>Co-EFFICIENT</b>					
<b>C</b>	0.0891*** (0.0124)	0.0973*** (0.0123)	0.0862*** (0.0125)	0.0926*** (0.0128)	0.0825*** (0.0125)
<b>LI</b>	0.0485*** (0.0096)	0.0489*** (0.0095)	0.0480*** (0.0096)	0.0483*** (0.0099)	0.0312*** (0.0098)
<b>CI5</b>	-0.0096* (0.0084)	-0.0147* (0.0082)	-0.0086 (0.0084)	-0.0166** (0.0086)	-0.0160** (0.0083)
<b>CIR</b>	-0.0256*** (0.0099)	-0.0282*** (0.0098)	-0.0252*** (0.0099)	-0.0227*** (0.0103)	-0.0193** (0.0099)
<b>RDI</b>	-0.0453*** (0.0114)	-0.0479*** (0.0112)	-0.0460*** (0.0114)	-0.0573*** (0.0118)	-0.0469*** (0.0113)
<b>NPL</b>	-0.0502*** (0.0193)	-0.0486*** (0.0190)	-0.0487*** (0.0193)	-0.0330* (0.0197)	-0.0245 (0.0191)
<b>LNTA</b>	-0.0000** (0.0000)	-0.0000** (0.0000)	-0.0000* (0.0000)	-0.0000*** (0.0000)	-0.0000*** (0.0000)
<b>BAPA</b>	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
<b>D</b>	-0.0161*** (0.0022)	-0.0188*** (0.0022)	-0.0187*** (0.0027)	0.0003 (0.0026)	0.0197*** (0.0025)
<b>R-squared</b>	0.3236	0.3373	0.3202	0.2881	0.3279
<b>Adj. R-squared</b>	0.3096	0.3237	0.3062	0.2734	0.3141
<b>F-stat</b>	23.2323	24.7222	22.8757	19.6549	23.6987
<b>F-stat (prob.)</b>	0.0000	0.0000	0.0000	0.0000	0.0000
<b>AIC</b>	-3.9070	-3.9275	-3.9020	-3.8559	-3.9135
<b>SIC</b>	-3.8025	-3.8231	-3.7975	-3.7514	-3.8090

Standard errors are in parentheses. \*, \*\* and \*\*\* indicate statistical significance at the 10%, 5% and 1% levels.

The result of the last dimension is presented in model D15. In this model, the efficiency of financial sector is studied by the variable ROAH. The result shows that the coefficient of dummy variable ROAH is positive and statistically different from zero. This can be intuitively interpreted that by holding the other factors constant, the level of economic growth is higher in countries with more efficient financial market.

Based on the above findings, it can be concluded that the level of economic growth can be different under diverse market characteristics. Therefore, the policy makers of each country need to take these facts into consideration before developing the policy as well.

## **6. Conclusion and Recommendation**

This paper contributes to the existing literature gap by exploring the linkage between bank competition, using both structural and non-structural measures, and economic growth. To date, there are only a few empirical studies investigating the relationship between them. In this paper, both micro bank-level and macro country-level data from a selected sample of 81 countries during the year 2000 to 2013 are used. The data at bank-level is aggregated to be at country-level, then the fixed effect regression analysis is conducted to examine cross-country information. The stylized facts obtaining from the study can be summarized as followings.

Firstly, the proxies for bank competition, specifically the market concentration and market pricing power, indeed have the opposite effect on economic growth. The empirical results show that the structural competition measure has a negative relationship with economic growth. That is, when the market becomes more concentrated, it is associated with lower economic growth. Therefore, more-competition-more-growth hypothesis is supported. On the other hand, the non-structural competition measure has a positive relationship with economic growth. That is, when banks have more pricing power, it is associated with higher economic growth. Therefore, more-competition-less-growth hypothesis is supported.

Secondly, as the dummy variables for high access to finance (FBFWH and FBFIH) and high credit to private sector (CPSRH) are negative and

statistically different from zero, it can be concluded that by holding the other factors constant, the level of economic growth is higher in countries with lower access to bank funding and lower credit to private sector relatively to GDP. Also, the dummy variable for high banking system efficiency (ROAH) is positive and statistically different from zero, it can be concluded that by holding the other factors constant, the level of economic growth is higher in countries with more efficient banking system.

From the above findings, it can be concluded that there are actually two angles of competition; the market concentration and the market pricing power. As the impacts of these two angles of competition can produce opposite effect on economic growth, they indeed have important policy implications. In order to promote economic growth, the policy makers need to consider the policy that (1) makes the banking industry to be less monopolized by a few key players and (2) ensures that all players have enough margins (incentive) to provide loan to private sector. Additionally, the level of economic growth tends to be higher in countries with lower level of accessibility to bank funding, lower credit to private sector and more efficient banking system.

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