IJFBS
Finance & Banking Studies

Finance & Banking Studies

IJFBS, VOL 10 NO 1 ISSN: 2147-4486

Contents available at www.ssbfn.net/ojs

<https://doi.org/10.20525/ijfbs.v10i1.1032>

Bank Competition and Economic Growth: The short-run and long-run effects

Champika Liyanagamage

Department of Accounting and Finance, The Open University of Sri Lanka, Nawala, Sri Lanka
<https://orcid.org/0000-0002-1147-168X>

Abstract

This paper provides rather scares evidence on the nexus between bank competition and economic growth in a unique developing economy; Sri Lanka for the period 1996-2018. The effect of competition in the Sri Lankan banking sector on economic growth, and the mechanisms through which competition affects growth are analyzed in the present paper. The VEC model used in this study was aimed at capturing independently the short and long-term effect of bank competition on economic growth. The competition is measured with Pazar-Ross H- Statistics. Contrary to the common wisdom, the study found evidence for negative effects of bank competition, on economic growth in the short run. However, in the long run, this effect is strong and positive. Further, the statistical results of this paper revealed that higher bank competition channels economic growth through interest rate and bank efficiency. These findings have important policy implications as it gives great insight into the complexity of competition related conduct in developing countries.

Keywords: bank competition; bank efficiency; economic growth; VEC model; interest rate

JEL Classifications: E44; G21; L10; O10

Introduction

The recent theoretical and empirical literature on bank competition focuses on the multifaceted effects of bank competition on the economy. The literature on financial development and growth has recognized that financial sector development is crucial both at micro as well as macroeconomic levels (King and Levine 1993; Creel et al, 2015). According to the industrial organization theory, a competitive financial sector is necessary for maximizing social welfare and achieving the optimum level of efficiency. Therefore, banks competition promotes economic development by reducing the cost of finance and by offering financial facilities required by other industries for their production process. This argument has also been evidenced in more recent literature (Amidu & Wilson, 2014; Rakshit & Bardhan, 2019). These theories, hence, argue that banking sector competition reinforces economic growth by boosting capital accumulation in an economy. However, the theories related to competition fragility view question about the economic role of higher bank competition as it increases instability by eroding quasi-monopoly rent and discouraging banks to properly screen their borrowers (Jemenez et al, 2007; Allen and Gale, 2004). Therefore, unstable financial sector negatively effects on sustainable economic growth (Owusu & Odhiambo, 2014).

The banks in an economy play a vital role, making the subject of banking sector competition particularly crucial. The significance of bank competition is endorsed by some empirical studies which confirm a robust relationship between the market structure of the banking industry and economic growth (Jayaratne and Strahan, 1996; Beck, Levine and Loayza, 2000). However, many recent theoretical and empirical findings have opened-up a debate on the economic implications of banking sector competitiveness (e.g., Allen and Gale, (2004), Berger et al., 2008). Nevertheless, the positive outcome of competitive financial markets on their economies depends on the institutional environment in which these financial markets operate. The progressive agreement in the literature is that competition-related conduct of financial liberalization fosters economic development only if many preconditions have first been fulfilled (Fry, 1995). Then the question becomes essentially empirical with these undeniable predictions.

The financial sector at present in Sri Lanka for the most part reflects functional features of an advanced financial system, owing to the wide-ranging reforms initiated in the 1990s. The banks are effective in most of the aspects of financial services and most of the banks have subsidiaries or affiliates involved in insurance and some other capital markets activities. These changes together with ongoing economic and regulatory integration aimed at enhancing competitiveness and efficiency in the Sri Lankan banking sector. The outcomes of these developments are also reflected in the changing market structure of this sector in the recent past. Nevertheless, the common hurdle that can be witnessed in many developing countries is evident in Sri Lanka as well. That is the less conducive environment comprising of financial infrastructure or the prerequisites for competition. Consequently, the collective net outcome of these changes on financial market development in developing economies such as Sri Lanka is ambiguous and inadequately disclosed in the present literature.

The primary purpose of the present paper is to investigate the ultimate macro level impact of bank competition in the context of Sri Lanka. Therefore, whether competition in the banking sector has any significant effect on economic growth in Sri Lanka, and if so the mechanisms through which competition affects economic growth are analyzed in the present paper. This analysis will particularly enhance our understanding of the relevance of a theoretically established finance growth nexus, in a unique developing country. The findings of this paper will also help in developing policy measures through a broader insight into the complex relationships that have perhaps been uncaptured in theories formed in the context of developed countries.

In this paper, a broad empirical analysis has been carried out to investigate competition growth nexus in Sri Lanka. The theoretically tested first order effects of bank competition; interest rate, efficiency and stability have been studied to capture the complex transmission mechanism from competition to growth. This paper applied an industrial organization approach in measuring competition and frontier approach in measuring efficiency. The bank stability was measured with Z score. An econometric model is developed and estimated by using the cointegration technique. The Vector Error Correction (VEC) model was employed in this study as it distinguishes the short and long run relationship of study's dependent variable. The sample covers 24 commercial banks which represent the entire commercial banking sector in Sri Lanka (as of the end of 2018) for 23 years starting from 1996. However, the conclusions drawn in this paper will have limited applications as it is based on a single unique economy and generalization would be possible with a cross-country analysis.

The rest of the paper is organized with a review of theoretical and empirical literature pertaining to competition growth nexus and a description of the measurement of variable, and econometric model of the study, followed by a presentation and interpretation of the results of the stepwise analysis.

Literature Review

Considerable research interest has emerged in last two decades with a debate on the economic implications of bank competition. According to the economic theory, a higher degree of competition in an industry enhances the welfare of the economy. The Banking industry is not an exception to this economic theory. Therefore, the common acceptance is that banks that exercise monopoly power usually charge higher interest rates from borrowers when providing loans whilst paying lower interest rates for depositors. As per Cetorelli and Gambera, (2001) the economic repercussion in such a monopoly bank market is twofold. First, the above average interest rates discourage banks from screening the quality of lenders, and second, the higher costs of loans detain the firms from new investments, thus slowing down the firms' expansions and productivity growth. The heightened interest rate would further decrease the capital accumulation in the economy, eventually affecting the overall economic growth undesirably (Cetorelli and Gambera, 2001).

Similarly, recent empirical studies such as Amidu & Wilson, (2014), states Competition in the financial sector drives banks to innovate, reduce product prices, and increase quality, thus enhancing choice and growth. According to Caggiano and Calice (2016), banking sector competition can affect economic growth in two ways: First, it eases access to credit for small and new firms and second, it helps financial dependent firms to grow faster. They argue with the development of them intern affect economic growth.

The study of Claessens & Laeven, (2003) which focus on a cross-country analysis also provide no evidence that market power has any positive impact on access to financing. Contrarily, the results of their cross-country study imply that the intensity of competition is a crucial aspect of both financial sector development and economic growth. The mechanisms through which the higher competition may foster economic growth are not addressed in their study. However, they add some evidence for the existence of allocative efficiency in bank competition. The findings of Liyanagamage (2014), reveal that the relationship that exist between competition and efficiency in the banking sector in developing countries is U-shaped. Accordingly, the efficiency of banks decreases with increasing competition up to a minimum point and starts increasing thereafter.

Some empirical studies find evidence for highly robust effect of banking sector competitiveness on real economic activities (Laeven, 2005; Ngare et al., 2014; Creel et al., 2015). Furthermore, Smith (1998) analyzes the cost of imperfect competition in banking in terms of macroeconomic performance and uncovers that higher level of bank competition improves the level of income and lessens the severity of business cycles. His concluding remarks very strongly point out the adverse consequences that an imperfectly competitive banking market produces on macroeconomic performance, and further state that, those consequences are worse than the effects that would have when there are no banks. However, there is no consensus in the literature regarding an optimum level of bank competition. In this aspect with regard to developing countries, the findings of Liyanagamage (2018) highlight that there is no exact level as an optimum level of bank competition, rather there is a minimum level of competitiveness that should be maintained by the banking sector in order to be efficient and financially stable.

However, according to the literature on 'competition fragility view', competition is deemed as undesirable as higher bank competition wears down market power, cuts off profit margins, and resulted in franchise value reduction. The motivation of banks to accept more risk to grow their profit margins will create instability in the banking sector, finally eroding the positive outcome expected with bank competition. By using data on the Spanish banking system, concentration indices, and Lerner index, the empirical findings of Jimenez et al, (2007) support the 'competition fragility view'. Their findings reveal that more competition is associated with a higher-risk loan portfolio. Fungacova and Weill (2009) further support this forceful view by studying a large sample of Russian banks during 2001-2007 and by measuring bank competition with the Lerner index. Their findings unambiguously highlighted that higher bank competition is detrimental to financial stability. In the literature, on cross-country analysis, Beck et al. (2008) observe that the probability for a systemic bank crisis is less in concentrated banking markets compared to competitive banking systems. Consequently, this evidence questions the definitive outcome of bank competition on real economic activities.

The empirical findings on bank competition significantly vary with the measure of bank competition. Empirical studies on bank competition have employed different instruments to measure the degree of competition. These instruments basically represent two major approaches: structural and non-structural. The structural approaches emphasize on bank market structure in assessing competitiveness. Hence, they used for instance, concentration ratios or indices like the Herfindhal-Hirschman Index, which measures the degree of market concentration. Non-structural approaches to measuring competitiveness are built on 'new empirical industrial organization' (NEIO) literature which ignores the structure of the market in measuring competitiveness. The Lerner Index (1934), Panzar-Rosse (PR) approach (Rosse and Panzar, 1982, 1987) as well as Bresnahan-Lau method (Bresnahan, 1982, Lau, 1982) are the non-structural approaches to quantify the competitiveness.

PR approach has been extensively used in most empirical studies. The PR H-statistic is estimated by taking the sum of the elasticities of a firm's revenue in relation to its factor input prices. By using a sample of banks in New York, Shaffer (1982) reported the first application of PR H statistics in banking literature. Many subsequent studies such as Molyneux et al. (1996); Fu (2009) Staikouras and Koutsomanoli Fillipaki (2006) applied this approach in their studies. Though, the analysis of existing empirical findings shows that there is no single measure of competition that has been accepted and applied in all the studies. Some studies have even used two approaches to measure the level of competition and have found contradictory findings. (e.g., Valverde et al, 2009). Hence, the applicability of an approach to measure the degree of bank competition may vary across countries. However, what stems from the analysis of existing literature is that the level of bank competition needs to be measured in a way that considers the actual conduct of banks, as the competition is not merely concentration. Therefore, the findings of this study will enrich the existing literature by a way of testing their applicability in the context of developing countries. Further, this kind of study is necessary to identify the modifications that need to be made to the existing theories in explaining competition growth nexus in developing countries like Sri Lanka.

Research Methodology

The traditional industrial organization approach theorizes that outputs are produced at a minimum cost in a perfectly competitive market, and hence, productive efficiency is obtained. According to the theoretical models such as Klein (1971), low competition in the bank market charges higher interest rates. Therefore, theoretically, the first-order effect of bank competition is on the interest rate. Evidence of subsequent empirical studies too supports this relationship (Hannan, 1991; Besanko and Thakor, 1992; and Maudos and Guevara, 2004) However, when analyzing the nexus between competition and growth, it is important to consider bank competition as a part of a broader economic objective. Therefore, it is of paramount importance to analyze possible tradeoffs between competition and different dimensions of effects, mainly, bank efficiency, access to finance, and financial stability. The reason is that analysis of competition growth nexus needs to be done with a holistic approach that focuses, at least, on the major dimensions of effects of bank competition at the macro level.

The analysis of this paper starts with formulating relevant theoretical statements in the form of equations and then investigating with available data. Therefore, a broader set of micro and macro-economic data pertaining to the Sri Lankan banking sector covering the period from 1996 to 2018 was used in this study. To test the effect of bank competition on economic growth, the study applied the following steps. At first, the degree of competition of the banking sector was estimated by using the Pazer-Ross approach. Then, the banking efficiency and banking sector stability were estimated by using Data Envelope Analysis (DEA) and Z-index, respectively. Then the researcher undertook the empirical test to investigate the implications of bank competition on economic growth.

The researcher carried out a macro-level examination to test the competition growth nexus and analyze the mechanisms through which if competition affects growth in the context of Sri Lanka. For this purpose, Equation 1 given below will be analyzed by using cointegration techniques.

$$Growth_t = f[Competition_t, Efficiency_t, Stability_t, Interest_t] \quad \dots\dots\dots \text{Equation 1}$$

The dependent variable Growth denotes the average rate of annual economic growth. Growth is modeled as a function of bank competition measured with H statistics, the annual average score of bank efficiency measured with DEA, annual average stability score measured with Z-index and annual interest rates (three months Treasury Bill rates) of the country. The study conducts the cointegration test to examine the relationship between bank competition and economic growth in Sri Lanka. Cointegration test can provide

more reliable conclusions about the consequence of banking sector competition. For this purpose, the study will follow the necessary steps to assess the bank competition and economic growth trade-off by utilizing a Vector Error Correction (VEC) model, through which the short-run and long-run effects can be identified separately.

After assessing well established competition measurements in the literature, the study selected to apply the approach developed by Panzar- Rosse (1987). They identify a measure of competition, the H statistic as the totality of the elasticities of the bank factor input prices to the elasticity of bank output price in a reduced form revenue equation. According to their clarification, this H statistic signifies both the structure as well as the conduct of the market. It therefore, reflects the percentage change in bank revenue caused by the percentage increase in the price of all factor inputs used by the bank. By assuming one output and three inputs employed by the bank, the PR model estimated in the present study is as follows.

$$\log TR_{it} = \alpha + \beta_1 \log IPL_{it} + \beta_2 \log IPF_{it} + \beta_3 \log IPC_{it} + \lambda_1 \log TA_{it} + \lambda_2 \log NPL_{it} + \lambda_3 DV + \lambda_4 BR + e_{it} \quad \text{--- (Equation 2)}$$

In Equation 2, TR_{it} is the total revenue income (output price) earned by bank i in time t and IPL_{it}, IPF_{it}, and IPC_{it} are the staff cost to total deposit ratio (input prices of labour), interest expenditures to total deposits ratio (input price of funds) and operating and administrative expenses to total assets ratio (input price of capital) respectively. β₁, β₂ and β₃ denotes their elasticities, respectively. The degree of competition in the bank $H = \sum_{i=1}^n \beta_i$ where lower score reveals a lower level of competition and vice versa, bank size (total assets), amount of Nonperforming loans (NPL), the possible scale economies (measured with the number of branches, BR) and foreign bank dummy variable (DV) were also included in the above equation to control any effect of such variables on bank revenue.

There are many approaches available to measure firm efficiency. However, regarding banking sector efficiency analysis, measuring the performance of each bank relative to others in the sector is more important. Frontier approaches used for measuring firm efficiency comparative to “best practice” frontiers comprising of other firms in a particular sector. In this study bank efficiency is measured with Data Envelopment Analysis (DEA), the most commonly used non-parametric frontiers approach in determining the intensity of efficiency. It summarizes firm performance in a single statistic and provides more reliable and meaningful measures of bank efficiency. As a measurement of relative efficiency, DEA was first introduced by Charnes, Cooper, and Rhodes (1978). By using DEA bank efficiency can easily be compared with the best bank in the industry. Accordingly, the highest score 1 is assigned to the best bank while all the other banks are assigned values between 0 and 1. The formulation of the DEA model is stated in Equation 3 below.

$$\begin{aligned} \text{Maximize } E_{ks} &= \frac{\sum_y O_{sy} V_{ky}}{\sum_x I_{sx} U_{kx}} \quad \text{----- (Equation 3)} \\ \text{Subject to } E_{ks} &\leq \forall \text{ bank } s \\ U_{kx}, V_{ky} &\geq 0 \end{aligned}$$

EKS represents the efficiency score of bank s, using the weights of test bank k. O_{sy} shows the value of output y for bank s; V_{ky} is the weight assigned to bank k for output y; I_{sx} is the value for input x of bank s; and U_{kx} is the weight given to bank k for input x.

In the empirical analysis to investigate the bank stability as a transmission mechanism of competition to growth, the study uses the Z-index to measure stability. The Z-Score joins some important factors in a statistically developed equation and therefore gives an effective explanation about the overall risk of a bank. It combines the bank’s profitability (Return on Assets), its capitalization level (Equity to Asset ratio), and return volatility (standard deviation of profits) and calculated as:

$$Z = \left(\frac{ROA + E/A}{\sigma_{ROA}} \right) \quad \text{--- Equation 4}$$

The Z-score rises with profitability and capitalization level but drops due to higher volatility of profits. Accordingly, a larger value of Z-score suggests higher bank stability whereas lower values suggest lower

stability. Many latest banking studies such as Schaeck and Cihak, (2008) and Berger et al, (2008) have used Z-score to measure bank stability.

Findings and Discussion

This section presents the findings of the stepwise analysis of the econometric model presented in Equation 1. The model conducts the cointegration test and seeks to examine the competition-growth nexus and to assess the mechanism through which if competition affects economic growth in Sri Lanka. The cointegration test will help to provide a more robust conclusion about the consequences of banking sector competition. When there are two or more variables cointegrated, they will share a common trend (Granger,1988). Although the existence of causality is specified, the direction of causality is not revealed in this test. Thus, the study applies the Vector Error Correction (VEC) model which is derived from vectors of cointegration. The step-by-step analysis of the model is discussed below.

Dynamic Behavior of variables

The main decisive variable of this paper is bank competition. In addition, bank efficiency, stability, and interest rate also considered analyzing the mechanisms through which competition affects economic growth. Before moving to test the model specified in this study, it is important to measure and identify the intensity of competition and other macro variables in the model and their dynamic behavior throughout the sample period.

As per the results of Equation 2, the average H statistic for the sample horizon is 0.55. This statistic indicates that the banking market of the country is neither perfectly competitive as it is significantly different from 1 nor monopolistic in nature as it is far from zero. Hence, as per the categorization PR approach, H statistics found in this paper provide sufficient evidence for the existence of a 'monopolistic competitive' type banking market in Sri Lanka. The annual H statistics also do not reveal significant deviations from this mean value, however, depicts slight increases and decreases over the sample period as depicted in Figure 1. A closer look at the dynamic behavior of this competitive measure shows that degree of competition in the Sri Lankan banking sector has typically been between 0.4 and 0.6 except in year 2006-2008. The lowest competitive conditions (during 2006-2008) in the country occurred during the peak time of Civil war indicating the impact of political instability in economic activities. The bank efficiency and stability scores were averaged at 0.45 and 18.2 respectively, symbolizing the less efficient and less stable banking sector in Sri Lanka. They also show some significant fluctuations in their time-series behavior except few years during the sample period as showed in figure 2 and 3. It is noticeable that bank efficiency has been increasing from year 2000 to 2006 period and falling thereafter. Bank stability too depicts an upward trend since 2002 until it starts to decline in 2010. In addition, economic growth and interest rates of the country portray high variations, indicating instability characterized in developing countries (Figure 4 and 5). These time series patterns provide some signs of complicated relationships among these macro level variables encourage further analysis. The graphical presentations of these time series are shown in Figures 1 to 5.

Figure 1: Bank Competition 1996-2018

Figure 2: Bank Efficiency 1996-2018

Figure 3: Bank Stability 1996-2018

Figure 4: Economic Growth 1996-2018

Figure 5: Interest Rate 1996-2018

The test for the order of integration

All the data employed in Equation 1 are time series data. One of the basic problems with most of the time-series data is that they are non-stationary. Many statistical estimation methods assume that the time-series is stationary. This implies that it assumes statistical properties of variables are constant over time. Therefore, test for stationary is an essential requirement before progressing further on the analysis. If the variables are not stationary, steps must be taken to stationarize them. This would help to obtain reliable sample statistics such as mean, variance, and correlations among variables. The prediction based on these statistics can be done only if the series is stationary.

The non-stationary nature of macro-economic time-series is common in most developing countries. Analyses and interpretations of such data give spurious correlation and misleading results. Hence to avoid such misleading results the stationary is tested with the Augmented Dicky Fuller (ADF) test. This test helps one to know that when to different time series data to make it stationary. It runs in a form of regression of which the series is regressed on the lag 1 first difference of the series itself, more lagged differencing terms, an intercept, and a time trend. Unit root test results of ADF are given in table 1.

Table 1: ADF test results for Unit Root

Variable	Lag length	With intercept	With intercept and trend
<u>Levels</u>			
Growth	0	-3.2109**	-3.4340**
Competition	1	-3.1512**	-3.4414*
Efficiency	0	-1.6092	-1.5782
Stability	0	-0.1799	-0.7805
Interest	1	-3.2663**	-3.5218*
<u>First difference</u>			
Growth	0	-5.3968***	-5.6328***
Competition	1	-4.4331***	-4.6780***
Efficiency	0	-3.2096**	-3.3568***
Stability	0	-2.3295	-2.3652**
Interest	0	-3.6734**	-3.8683***

Note: Lag lengths are automatically based on SIC MAXLAG=3. * ** *** represents significant at 1% , 5% and 10% respectively and are based on MacKinnon (1996) one-sided p-values. The critical values are values given in the e-views output.

The null hypothesis (H0) is that there is a unit root. As given in the above table the null hypothesis is rejected for variables growth, competition, and interest in the levels, while the null hypothesis cannot be rejected for the efficiency and stability variables. However, in order to keep the consistency among the variables, the first difference of the variables also concerned. As given in the latter part of the above table, the null hypothesis of a unit root at first difference can be rejected at 5% and 1% level of significance. That means all the variables except Stability at their first difference, are stationary. By excluding the variable Stability from the model (as it is non-stationary at first difference) it could be concluded that the time series of variables are integrated of order one, I(1).

Test for cointegrations

After integrating the model variables to the same order, the next step is to implement the test of cointegration to identify the number of cointegrated relationships on the model. This helps to recognize the existence of a long-run stable relationship in the model. The intention of performing the cointegration test is to verify if several non-stationary time-series are cointegrated. For this, Johansen Cointegration Test was used, as it is stronger when more variables are entered into a model. The variables incorporated in the model need to be cointegrated with at least one cointegrating vector. The results are produced in Table 2.

Table 2: Results of Johansen test for multiple cointegrating vectors

Variables: growth, competition, interest, efficiency		
P=1		
H0	Maximum Eigenvalue	Critical value
None*	57.3658***	27.58
At most 1	14.2048	15.13
At most 2	9.3665	14.26
At most 3	0.3451	3.84

Note: 'At most' refers to the number of cointegrating vectors. * indicates rejection of the hypothesis at the 0.01 level. ** and *** denote the significance at 5% and 1% level of confidence based on MacKinnon-Haug-Michelis (1999) p values.

Cointegration implies the long-run relationship that exists among non-stationary time series. The results produced in table 2 indicate the hypothesis of zero cointegration, at 5% level of confidence. Accordingly, the hypotheses 'none' integrated vectors, 'at most 2' integrated vectors, and 'at most 3' integrated vectors are rejected at a 5% level of confidence. And 'at most 1' integrated vectors are not rejected at the confidence

level of 5%. This suggests that variables in the equation are cointegrated with one integrating vector in the equation. After having identified the number of cointegrations in an equation, the method that should be applied for estimation is the Vector Error Correction (VEC) model. VEC model allows us to distinguish between short-run and long-run Granger type causalities. Short-run Granger causality from variables Competition, Efficiency, and Interest rate in the existence of cointegration is assessed with each individual coefficient. There is a valid error correction representation of data since many cointegrating vectors found in the model. This is described as the error correction term in the equation, and it measures the presence of long-run causal relationship.

The empirical results of the VEC model

The results of the estimated VEC model produced in Table 3. There, all the variables except Ect1 show a negative association with economic growth. Accordingly, the economic growth rates of previous two years negatively affect the economic growth of the present year. Both the coefficients are very strong and statistically significant at 1% and 5% levels for the (t-1) and (t-2) respectively. The coefficient found in relation to the effect of the previous year's competition is negative and statistically significant at a 5% level. This shows that competition affects economic growth negatively in the short run. This relationship is quite contrary to the expectations of the industrial organization theory as well as the MacKinnon-Shaw paradigm. However, this relationship is statistically significant only at a 15% level of confidence for the year (t-2).

Table 3: Empirical Estimation of VEC model

$\text{Growth} = 0.0096 - 1.4469(\text{Growth})_{-1} - 1.0181(\text{Growth})_{-2} - 0.6119(\text{Comp})_{-1} - 0.3049(\text{Comp})_{-2}$				
(0.7738)	(-3.6677)***	(-2.1486)**	(-2.1369)*	(-1.4446)++
$-0.0003(\text{Interest}) - 0.1225(\text{Efficiency}) + 0.2957 \text{ Ect1}$				
(-0.1939)	(-1.0282)	(2.25)**		
Adjusted R ² = 0.5960		F statistics = 4.1077		Wald test = 5.88**
Bera test for Normality = 6.9749*		LM test for serial correlation = 4.9409**		Jarque-

Note: The selected lag length was equal to two due to the small sample. t-values are given in parentheses, where *, **, and *** denotes levels of significance at 1%, 5%, and 10% respectively. ++ denotes the level of significance at 15%.

The result of the Wald test reveals the collective explanatory power of the short-run variables of bank competition. Therefore, it can be concluded that bank competition makes an explicit negative impact on the growth potentials of the Sri Lankan economy in the short run. The effect of interest rate on economic growth was found as negative. However, one cannot say much about this relationship as this coefficient is neither strong nor statistically significant. Banking sector efficiency shows a negative impact on the rate at which the economy grows. In other words, the coefficient value of the Efficiency indicator says higher the bank efficiency lowers the economic growth. However, the statistical insignificance (significance at 30% level of significance) of this coefficient discourages further discussion of the effect of bank productive efficiency on economic growth in the short run. These findings are quite contradictory with the common theoretical explanations (Cetorelli and Gambera, 2001) as well as some empirical findings (Amidu & Wilson, 2014; Rakshit & Bardhan, 2019) which reveal positive implications of bank competition on economic growth. The findings of the present study also differ from the findings of Banya and Biekpe (2017) who analyzed the competition growth nexus in Africa. However, their competition measurement is Boone Indicator. The difference in socio-economic background between these countries and Sri Lanka and the methodological disparity could have been the reason for these conflicting results.

The long-run relationship of the equation is given by Ect1. The Ect1 found in the above analysis is positive and statistically significant at a 1% level. Confirming the theoretical expectations, this coefficient provides evidence of positive implications of bank competition on economic growth in the long run. Theoretical predictions of industrial organization theory invoke higher competition to improve the availability of funds for investment thereby generating direct positive implications on the rate of economic growth. The empirical

evidence found in the study however suggests a time lag of this transmission. In other words, negative implications of bank competition on economic growth transmit to positive implications in the long run. Industrial organization theory further explains this competition growth nexus through the efficiency channel. The found statistical evidence on the effect of both bank efficiency and interest rate is negative in the short run. Therefore, further analysis is needed to conclude on the mechanisms through which competition affects the economic growth rate. However, based on the VEC model analysis, it is certain that the intensity of the relationship between bank competition and economic growth rate is consistent with the expectations of Industrial organization theory and the MacKinnon-Shaw paradigm.

However, the findings of the VEC model analyzed here are inconsistent with the findings of Claessens and Laeven (2003). They studied 29 banking systems and highlighted the importance of competition in the financial sector on economic growth through improved access to external financing for all firms. And their findings revealed that the relationship between bank competition and accessibility to financing (and then growth) varies with the level of development of the financial system. More specifically they reveal that industries that depend on loan financing grow faster in countries with less developed and less competitive financial systems, while the opposite relationship can be observed in more developed financial systems. The present study however found a long-term positive effect of bank competition even though Sri Lanka is a less developed country.

The VEC model analyzed in the present study tests whether competition affects economic growth through interest rate and bank efficiency. However, the tested VEC model did not control for the effect of degree of development in the financial sector. Therefore, much cannot say about this inconsistent finding.

Transmission Mechanisms from Competition to Growth

The VEC model analyzed above produced statistical evidence to prove the short-run negative consequence bank competition has on economic growth. while showing the reverse effect in the long run. Further analyses are needed to be carried out, to assess the long-run transmission mechanism through which competition promotes economic growth. For this purpose, the short-run and long-run relationship between efficiency and competition, interest rate and competition, growth and interest rate, and growth and efficiency, need to be analyzed. Accordingly, four panels were derived from the original sample and the null hypothesis was tested by using the VEC model. The summarized results are given in table 4. Testing the null hypothesis in panel A produces evidence on both short and long-run negative coefficients for interest rate changes on economic growth. This means that a lower interest rate promotes the rate at which the economy can grow in both the short and long runs. Similarly, bank efficiency is positively affected by bank competition explicitly. Nevertheless, the effect of bank competition on bank efficiency is positive in the short-run as well as in the long-run. More interestingly, the study finds that bank competition affects the interest rate positively in the short-run and negatively in the long-run. These interrelationships can be used to give further insight into the competition growth nexus in Sri Lanka.

Table 4: Causality test for the economic growth

Panel A: H0 = Interest rate does not Granger cause economic Growth	
Short-run	- 0.0249 ***
Long-run	- 0.1016*
Panel B: H0 = Efficiency does not Granger cause economic Growth	
Short-run	- 0.1293 ***
Long-run	- 2.3862*
Panel C: H0 = Bank competition does not Granger cause Efficiency	
Short-run	3.5582**
Long-run	- 0.0672
Panel D: H0 = Bank competition does not cause Interest rate	
Short-run	75.3512 ***
Long-run	-2.4237***

Note: *, **, and *** denotes level of significance at 1%, 5% and 10% respectively.

The short and long-term relationship between the variables in the model enhances our understanding of the mechanisms through which bank competition affects economic growth. As most of the short and long-run relationships are statistically significant, the study identified two major channels which affect the competition growth nexus in Sri Lanka. They are the bank efficiency and interest rate which perform the transmitting role of bank competition to economic growth. These repercussions can clearly be interpreted highlighting both

short and long-run aspects. Figure 6 is presented below to sum-up the competition-growth nexus more precisely.

Figure 6: Short-run and Long-run trade-off between Competition and Growth
 Source: Analysis by the author

First, in the short-run, competition affects positively both on interest rate and bank efficiency. Increased bank competition encourages banks to be more efficient by reducing wastages and utilizing their inputs at a maximum. Higher individual bank-level efficiency however in the short-run may be due to the higher interest margins. Hence, this in turn, affects the share of savings allocated to the investments to decrease and leads to lower economic growth. On the other hand, the positive coefficient of interest rate can be explained in the context of theories based on information asymmetries. Accordingly, in a highly competitive environment, when banks perform independently, an imperfect test to screen the creditworthiness of applicants can affect the equilibrium loan interest rate to increase in the short run. This kind of relationship can be possible in countries like Sri Lanka where the problem of information asymmetry is high. This higher interest rate causes a slowdown in the rate at which the country can grow in the short run. Hence in the short run higher interest rate and higher bank efficiency, discourage the economic growth of the country.

Second, in the long-run competition affects interest rate negatively. This is what was expected in the traditional theories based on industrial organization. In a highly competitive market, all the banks must adjust their interest rate to the market rate in order to retain the existing customers and to attract new customers. Hence, based on statistical results, it is possible to identify the interest rate as one of the mechanisms through which competition affects economic growth. An alternative explanation can be brought through the efficiency channel. In the long run, competition affects efficiency negatively. The squeezed down interest rates and the higher cost incurred on promotional activities, would be the reason for the negative impact of competition on bank efficiency in the long run (however, this coefficient is not statistically significant). Also, lower bank efficiency is an indication of decreased transaction costs and a low interest margin. With this, the portion of savings allocated for investments would rise leading to higher economic growth in the long run. The findings of this paper are consistent with Jayakumar et al (2018), who also used panel VEC model to analyze the competition growth nexus in 32 European countries. However, their findings reveal that for both banking competition and banking stability Granger-cause economic growth in the long run, whereas present paper identifies interest rate and efficiency as the main channels through which competition affect economic growth in the long run.

Conclusion

This paper analyzed the nexus between banking sector competition and economic growth in the context of Sri Lanka. The VEC model was used in the analysis with the aim of capturing short term and long-term effects of bank competition on economic growth separately. Four major observations which are worth to be highlighted in this paper. First, the study found evidence of negative effects of bank competition on economic

growth rate in the short run. This is contrary to the expectations of the industrial organization theory. However, one of the explanations for the less common relationship found in this paper would be the nature of complex and unpredictable patterns of macro variables in developing countries. This is meant to say the complexity of relationships between economic variables in developing countries compared to those in developed countries. These complexities slow down the instant effects or changes in macro variables. Therefore, this macroeconomic complexity may have been responsible for the found short-run negative effect of bank competition on economic growth.

Second major observation is the found strong evidence of long-run positive effect of bank competition on economic growth. This relationship again highlights the complexity of macroeconomic variables in developing countries. These complexities cause a change in one variable to go through different channels to reach the expected outcome. Further, the results of the findings are suggestive of the necessity of a longer duration to transform the expected outcomes of economic actions. The next major observation is the discovered mechanisms through which competition affects economic growth in Sri Lanka. According to the statistical results of this paper higher bank competition channels economic growth through interest rate and bank efficiency.

The final major observation of the present paper is the nature of the bank efficiency variable. Banking sector efficiency measured with DEA analysis reflects the bank's relative ability to turn resources into revenue. Therefore, higher efficiency may reflect either decreasing cost or increasing income, or both. Hence, higher bank efficiency does not necessarily reflect banking efficiency in an economy. Because of this reason, there is a possibility to increase bank efficiency when the interest margins are wide and vice versa. This would have also been a reason for the negative effect of bank efficiency on economic growth. However, in the long run, the competition encourages banks to narrow down their interest margin in turn affecting improved economic growth.

Thus, statistical evidence of this paper supports the predictions of the industrial organization theory which says competition enhanced economic growth. This trade-off is channeled through the interest rate and the banking efficiency, as the theory highlights them further. However, the study cannot completely reject the predictions of theories based on information asymmetry on bank competition, because the findings of the study highlighted the role of information asymmetry in the banking sector and their effect on competition in the short run.

Therefore, authorities need to take all these concerns in developing the competition policy of the developing countries. Because a competition policy formulated based on conventional assessments could easily lead to incorrect conclusions which can have highly undesirable results on the economy.

References

- Allen, F. and Gale, D. (2004). Competition and financial stability, *Journal of Money, Credit and Banking*, 36(3), 453-480. 10.1353/mcb.2004.0038
- Amidu, M., & Wilson, J. O. S. (2014). Competition in African Banking: Do globalization and institutional quality matter? 31 p. <https://doi.org/10.2139/ssrn.2399050>
- Banya, R. M., & Biekpe, N. (2017). Bank competition and economic growth: Empirical evidence from selected frontier African countries. *Journal of Economic Studies*, 44(2), 245-265. DOI: 10.1108/SAJBS-07-2018-0079
- Beck, T., Levine, R., and Loayza, N., (2000). Finance and the Sources of Growth, *Journal of Financial Economics*, 58(2000), 261-300. 10.1016/S0304-405X(00)00072-6
- Berger, A.N., Klapper, L.F., and Turk-Ariss, R. (2008). Bank Competition and Financial Stability Working Paper No.4696, Policy Research Working paper series, World Bank. <https://doi.org/10.4337/9781785363306.00018>
- Besanko, D., and Thakor, A. V. (1992). Banking deregulation: Allocational consequences of relaxing entry barriers, *Journal of Banking & Finance*, 16(5), 909-932. [doi.org/10.1016/0378-4266\(92\)90032-U](https://doi.org/10.1016/0378-4266(92)90032-U)
- Bresnahan, T. F. (1982). The oligopoly solution concept is identified, *Economics Letters*, 10(1-2), 87-92. [https://doi.org/10.1016/0165-1765\(82\)90121-5](https://doi.org/10.1016/0165-1765(82)90121-5)
- Caggiano, G., & Calice, P. (2016). Bank competition, financial dependence, and economic growth in the Gulf Cooperation Council (World Bank Group, Policy Research Working Paper. 7687). The World Bank, Washington, D.C. <https://doi.org/10.1596/1813-9450-7687>

- Cetorelli, N., and Gambera M. (2001). Banking Market Structure, Financial Dependence and Growth: International Evidence from Industry Data, *Journal of Finance*, 56(2), 617–648. <https://doi.org/10.1111/0022-1082.00339>
- Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision-making units, *European journal of operational research*, 2(6), 429-444. [https://doi.org/10.1016/0377-2217\(78\)90138-8](https://doi.org/10.1016/0377-2217(78)90138-8)
- Claessens, S. and Laeven, L. (2003). What drives bank competition? Some international Evidence, *Journal of Money, Credit and Banking*, 36(3), 563-583. <https://doi.org/10.1596/1813-9450-3113>
- Creel, J., Hubert, P. and Labondance, F. (2015). Financial stability and economic performance, *Economic Modelling*, 48©, 25-40
- Fry M. (1995). *Money, Interest, and Banking in Economic Development*. Baltimore, The Johns Hopkins University Press.
- Fu, M. (2009, June). Competition in Chinese commercial banking In 22nd Australasian Finance and Banking Conference.
- Fungacova, Z., & Weill, L. (2009). How market power influences bank failures: Evidence from Russia, BOFIT Discussion Papers, 12, 2009. <http://dx.doi.org/10.2139/ssrn.1343173>
- Granger, C. W. (1988). Some recent development in a concept of causality, *Journal of econometrics*, 39(1-2), 199-211. [https://doi.org/10.1016/0304-4076\(88\)90045-0](https://doi.org/10.1016/0304-4076(88)90045-0)
- Hannan, T., (1991). Bank Commercial Loan Markets and the Role of Market Structure: Evidence from Surveys of Commercial Lending, *Journal of Banking and Finance*, 15(1), 133-149. [https://doi.org/10.1016/0378-4266\(91\)90042-K](https://doi.org/10.1016/0378-4266(91)90042-K)
- Jayarathne, J., and P. Strahan, (1996). The finance growth nexus: Evidence from bank branch deregulation, *Quarterly Journal of Economics*, 111, 639-670. <https://doi.org/10.2307/2946668>
- Jayakumar, M., Pradhan, R. P., Dash, S., Maradana, R. P., & Gaurav, K. (2018). Banking competition, banking stability, and economic growth: Are feedback effects at work?. *Journal of Economics and Business*, 96, 15-41. DOI: 10.1016/j.jeconbus.2017.12.004
- Jimenez, G., Lopez, and Saurina, J. (2007). How Does Competition Impact Bank Risk-Taking? Working Paper No.2007-23, Federal Reserve Bank of San Francisco. <http://dx.doi.org/10.2139/ssrn.965462>
- King, R., and Levine, R. (1993a). Finance and Growth: Schumpeter Might Be Right, *Quarterly Journal of Economics*, 108(3), 717-737. <https://doi.org/10.2307/2118406>
- Klein, M. A. (1971). A theory of the banking firm, *Journal of money, credit and banking*, 3(2), 205-218. <https://doi.org/10.2307/1991279>
- Laeven, L. (2005). Banking Sector Performance in East Asian Countries: The Effects of Competition, Diversification, and Ownership, World Bank and CEPR. <https://doi.org/10.1016/j.intfin.2015.09.003>
- Lau, L. J. (1982). On identifying the degree of competitiveness from industry price and output data, *Economics Letters*, 10(1-2), 93-99. [https://doi.org/10.1016/0165-1765\(82\)90122-7](https://doi.org/10.1016/0165-1765(82)90122-7)
- Liyanagamage, H.D.D. C. (2014). Rethinking the nexus between competition and efficiency in emerging economies: Evidence from Sri Lankan banking sector, *International Journal of Economics, Business and Finance*, 2(5), 1 – 15.
- Liyanagamage, H. D. D. C. (2018). Efficiency, Stability and Optimum Level of Bank Competition for Sustainable Development-A Study of Sri Lankan Banking Sector. *OIDA International Journal of Sustainable Development*, 11(09), 69-80. <https://doi.org/10.4038/kjm.v4i1.7486>
- Maudos, J., and Guevara, F. (2007). The Cost of Market Power in Banking: Social Welfare Loss vs. Cost Inefficiency, *Journal of Banking & Finance*, 31(7), 2103-2125. <https://doi.org/10.1016/j.jbankfin.2006.10.028>
- Molyneux, P., Thornton, J., and Williams, M. (1996). Competition and Market Contestability in Japanese Commercial Banking, *Journal of Economics and Business*, 48(1), 33-45 [https://doi.org/10.1016/0148-6195\(95\)00047-X](https://doi.org/10.1016/0148-6195(95)00047-X)
- Ngare, E., Nyamongo, E.M. and Misati, R.N. (2014). Stock market development and economic growth in Africa, *Journal of Economics and Business*, 74, pp. 24-39 DOI:10.1016/j.jeconbus.2014.03.002
- Owusu, E. L., & Odhiambo, N. M. (2014). Financial liberalisation and economic growth in Nigeria: An ARDL-bounds testing approach. *Journal of Economic Policy Reform*, 17(2), 164–177. <https://doi.org/10.1080/17487870.2013.787803>
- Panzar, J., and Rosse, J. (1982). Structure, conduct and comparative statistics, Bell Laboratories Economic Discussion Paper.
- Panzar, J., and Rosse, J. (1987). Testing for 'monopoly' equilibrium, *Journal of Industrial Economics*, 35(4), pp. 443-456. <https://doi.org/10.2307/2098582>

- Rakshit, B., & Bardhan, S. (2019). Does bank competition promote economic growth? Empirical evidence from selected South Asian countries. *South Asian Journal of Business Studies*, 8(2), 201–223. <https://doi.org/10.1108/SAJBS-07-2018-0079>
- Schaeck, K., and Cihak, M. (2008). How does competition affect efficiency and soundness in banking?, Working paper, no 932, European Central Bank. <https://doi.org/10.2139/ssrn.1088605>
- Shaffer, S. (1982). A nonstructural test for competition in financial market, *Proceedings of a Conference on Bank Structure and Competition*, Federal Reserve Bank of Chicago, 225-243. <https://doi.org/10.1080/09603100600687461>
- Smith, R. (1998). Banking Competition and Macroeconomic Performance, *Journal of Money, Credit and Banking*, 30(4), 793-815 <https://doi.org/10.2307/2601129>
- Staikouras, C., and Koutsomanoli-Fillipaki, A. (2006). Competition and concentration in the new European banking landscape, *European Financial Management*, 12(3), 443-482. <https://doi.org/10.1111/j.1354-7798.2006.00327.x>
- Valverde, S., Ferna Ndez, F., and Udell, G. (2009). Bank Market Power and Some Financing Constraints, *Journal of Review of Finance*, 13(2), 1–32 <https://doi.org/10.1093/rof/rfp003>