Does Bank Competition Reduce Cost of Credit? Evidence from Jamaica

Shadae Montgomery and Lisa-Kaye Wallace
Financial Stability Department[1]
Bank of Jamaica
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Abstract

It has been argued that the stickiness of loan rates on products offered by deposit-taking institutions in Jamaica is partly due to a lack of competition in the banking system. As such, this study investigates the effects of bank competition on cost of credit by utilizing a Generalised Method of Moments estimation technique and captures data covering the period March 2000 to December 2018. To test this relationship, the paper explores a broad set of competition measures including two structural measures: the Herfindahl-Hirschman Index and the Concentration Ratio of the two largest banks and two non-structural measures: the Lerner Index and the H-statistic. The key results arising from the study support the market power hypothesis, which posits that low competition results in higher lending costs. In addition, the authors observed that the effect of bank competition on interest rates in Jamaica is influenced by institutional and macro-economic factors. From a policy-oriented perspective, the findings indicate that there is need for more financial reforms aimed at enhancing competition as well as strengthening the responsiveness of interest rates to changes in competition in the Jamaican banking sector.

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[1] The views expressed are those of the authors and do not necessarily reflect those of Bank of Jamaica.

1.0 Introduction

The Jamaican banking system has traditionally exhibited high, sticky lending rates. In recent times, there has been growing debate amongst policymakers and local academia concerning the stickiness of loan rates and whether or not this is mostly due to a lack of competition. The debate runs concurrent with the fact that, over the past few years, Bank of Jamaica (BOJ) has largely adopted an accommodative monetary policy stance, and yet loan rates have remained generally elevated for the deposit-taking institution (DTI) sector. It is a widely held view that lower policy rates should increase banks' incentives to lend by lowering the opportunity cost of funds. However, this has not manifested in the case of Jamaica. Of importance is that since the latter half of 2009, BOJ has consistently lowered its signal rate, reducing it to a low of 1.8 per cent as at end-2018 from a high of 17.0 per cent at end-2008. [2] Despite this reduction in the signal rate, the average weighted loan rate for the DTI sector declined to only 13.0 per cent at the close of the same period relative to the 19.9 per cent recorded as at end-2008, indicative of the relative downward stickiness of loan rates (see **Figure 1.0**).

Furthermore, between 1996 and 1998, the banking system in Jamaica experienced a financial sector crisis which led to substantial structural changes in ownership structure and degree of concentration in the sector.[3] Subsequent studies have been conducted in Jamaica to evaluate the impact of bank concentration on performance as well as the effects of increased concentration on competition in the banking system.[4,5] Nonetheless, the relationship between competition and cost of credit remains broadly uninvestigated. It is against this background that this paper seeks to investigate the effects of banking competition on cost of credit in Jamaica.

[2] In 2017, BOJ announced that it will be fully transitioning its policy rate from the 30-day certificate of deposit to the overnight rate by the end of June 2017. It was noted that operating at the very short end of the market, where people who supply credit immediately feel the impact of a change in policy, is likely to transmit the impact of that policy change throughout the financial markets more effective (Brown, 2017).

[3] At the beginning of the crisis period in 1996, there were 51 DTIs in operation. However, this number declined to 25 institutions by the end of the crisis in 1999 and 11 institutions by the end of 2018.

[4] Bank concentration occurs when a few banks within the system dominate banking activities.

[5] See Bailey (2006) and Duncan (2002).

The remainder of this paper is structured as follows: Section 2 examines the theoretical and empirical relationship between competition and cost of credit based on previous literature. Section 3 presents the data and describes the econometric methodology utilized. Section 4 discusses the findings of the study and section 5 outlines the policy implications of the results as well as the conclusion.

2.0 Literature Review

Previous research regarding the degree of competition in the Jamaican banking sector by Bailey (2006) and Duncan (2002) indicated that the Jamaican banking system was highly concentrated and demonstrated an oligopolistic market structure. Meanwhile, the 2018 Bank of Jamaica Annual Report stated that, at end-2018, the number of institutions in the banking system was virtually unchanged over the preceding four years, as eleven DTIs remained in operation. Of note, the sector continued to be dominated by commercial banks which accounted for 91.0 per cent of the DTIs' asset base at end-2018. More specifically, the market share of the two largest commercial banks was approximately 58.2 per cent of total DTIs' asset base at end-2018, underscoring the highly concentrated nature of the Jamaican banking sector.

Globally, in the field of banking and finance, there are two dominant theories which describes the relationship between bank competition and cost of credit, namely: the market power hypothesis and the information hypothesis. The market power hypothesis is consistent with the traditional economic theory and posits that greater bank competition leads to lower lending rates and increased availability of credit. It suggests that fewer and larger firms are more likely to engage in anti-competitive behaviour. Conversely, the information hypothesis suggests that in the presence of asymmetric information and agency costs, competition can reduce access to credit by making it more difficult for banks to internalize the returns from investing in lending (see Petersen & Rajan, 2005).

Though the results have been mixed, a number of empirical studies support the traditional economic theory that greater competition enhances cost of credit. Love and Peria (2015) used the Lerner Index and Boone Indicator as competition measures in a cross-country

assessment using multi-year firm level surveys from 53 countries. The results indicated that greater competition increases access to finance. Furthermore, they found that the impact of competition on access to finance depends on the quality and scope of credit information sharing mechanisms as well as the economic environment in which banks operate. Deriantino (2009) also developed an empirical model that tested how banking competition affects the transmission of monetary policy changes in the loan market for Indonesia. Using the Lerner Index as a measure of competition, the results of the study showed that banking competition affects the transmission of monetary policy changes in the loan market. Specifically, they found that competitive banks are more responsive to changes in monetary policy, thereby implying that increases in bank competition may enhance the effectiveness of monetary policy transmission in loan markets.

Beck et al. (2003) assessed the effects of banking market structure on firms' access to finance by utilizing a unique database for 74 developed and developing countries, which covered small, medium-sized and large firms.[6] The findings of the study also supported the market power hypothesis and revealed that bank concentration increases financing obstacles, with a stronger effect on small and medium-sized firms. Results of the study also showed that a larger share of foreign-owned banks and an efficient credit registry dampened the effects of concentration on financing obstacles. On the other hand, greater restrictions on banks' activities, stronger government interference in the banking sector and a larger share of government-owned banks caused the opposite effect. Additionally, they discovered that economic, institutional and regulatory policies influenced the relationship between financing obstacles and bank concentration.

While there has been overwhelming evidence supporting the market power hypothesis, several of the empirical studies that derived opposite results supported the information hypothesis. In particular, Fungáčová et al. (2017), examined the impact of bank competition on the cost of credit using firms from 20 European countries.[7] The results

[6] The unique characteristics are evident in the detailed information provided about firms and the inclusion of small and medium-size firms.

[7] To measure competition, two structural measures (Herfindahl-Hirschman index and CR5) and two non-structural measures (H-Statistic and Lerner index) were utilized in the study.

suggested that bank competition increased the cost of credit and that the positive impact of bank competition was greater for smaller companies. This positive impact of bank competition was lower in crisis periods and was influenced by the economic and institutional framework of an economy. They also theorized that the lack of competition incentivized banks to invest in soft information or relationship lending.

Similarly, Petersen and Rajan (1995) emphasized banks' ability to form long-term relationships with borrowers and argued that monopolists lend more than competitive banks because monopolists can smooth profits over the course of their lending relationships. This was reinforced by Marquez (2002), who indicated that borrower-specific information becomes more disperse in more competitive banking markets, resulting in less efficient borrower screening and most likely in higher interest rates. In contrast, Cetorelli and Peretto (2000) revealed that there were offsetting effects of bank concentration and demonstrated that while bank concentration reduced the total amount of loanable funds, it increased the incentives to screen borrowers and thus the efficiency of lending. Furthermore, they posited that the optimal banking market structure is an oligopoly rather than a monopoly or perfect competition.

Of importance is that both the market power and information hypothesis yield contradictory conclusions. The market hypothesis predicts a negative relationship between bank concentration and access to finance, while the information hypothesis predicts a positive or non-linear relation. Nonetheless, the relationship might vary according to firm size, levels of economic and institutional development as well as ownership structures within the banking system.

Using a panel data set of 11 deposit-taking institutions, this study tested the following:

i. Is bank concentration positively or negatively related to financing obstacles?
ii. Is the relationship between concentration and financing obstacles influenced by institutional, financial and economic factors within Jamaica?

3.0 Data & Econometric Methodology

3.1 Data

The data used in this study comprise quarterly information spanning the period 2000:Q1 to 2018:Q4 and covers 11 deposit-taking institutions. In addition, the information is subdivided into three main classes, namely, bank-level and country-specific variables as well as competition measures (see **Table 1.0**).

3.1.1 Bank Level Variables

The key bank level variables include cost of credit, size and the overhead expense ratio. The cost of credit variable is defined as the domestic interest rate charged on loans by banks and represents the dependent variable utilized in the study. Size and the overhead expense ratio are two firm level control variables which are measured as the log of total assets and the ratio of overhead expense to total assets, respectively. These variables are used as a proxies for the level of institutional development of a firm.

3.1.2 Country-specific Variables

Regarding country-specific variables, these include GDP per capita, the 6-months Treasury bill rate and growth in the Jamaica Stock Exchange (JSE) Main Index. These variables are used as measures of economic development.

3.1.3 Competition Variables

In order to provide a comprehensive perspective of the impact of bank competition on cost of credit, this study utilizes four measures of competition which comprised of two structural measures and two non-structural measures. As the name suggests, the structural approach assesses bank competition by examining observable structural characteristics of a market, such as concentration ratios that are used to determine the behaviour of firms. This approach to using concentration as a measure of competition was largely influenced by the traditional Structural-Conduct-Performance paradigm, which postulates that fewer and larger firms are more likely to engage in anticompetitive behaviour (Berger, 1995).

However, whereas the traditional theory states that concentration erodes competition, Van Leuvensteijn et al. (2008) found that concentration and competition may instead increase simultaneously when competition forces consolidation. For example, in a market where inefficient firms are taken over by efficient companies, competition may strengthen, while the market's concentration increases at the same time. Therefore, in order to circumvent these limitations, non-structural measures are also used to check the robustness of the results of the study. In contrast to the structural approach, the non-structural approach measures competition without using explicit information about the structure of the market. Instead, these measures focus on obtaining estimates of market power from the observed behaviour of banks.

Structural Measures

The two structural measures outlined below are the Herfindahl-Hirschman Index (HHI) and the Concentration Ratio of the two largest banks (CR2), whereby lower values of these measures depict a high degree of competition.

- HHI Measure

The HHI is a simple and useful measure for assessing concentration within an industry. Notably, this tool is one of the most widely utilized summary measure of concentration in the literature and often serves as a benchmark for the evaluation of other concentration indices. The HHI highlights the importance of larger firms by assigning them a greater weight than smaller firms. It is calculated as the sum of the squares of market share for all banks (n) in the industry, where the total assets of each bank is used to calculate market shares (x_i) (see Equation 1).

$$HHI = \sum_{i=1}^{n} (x_i)^2 \quad (1)$$

During the review period, the HHI for the Jamaican banking system has remained relatively stable and above 1 900 index points (see **Figure 2.0**). Specifically, the index value ranged between a high of 2 698 and a low of 1 905 index points and averaged 2 124 index points for the assessed period. This reflects a moderately concentrated banking system relative to

the benchmark of 1 500 index points developed by the US Department of Justice.[8] Notably, it was observed that the market shares of the two most dominant banks drove the pattern and movement of this structural measure over the entire sample period. This implies that some form of oligopolistic behavior may characterize the market.

- CR2 Measure

Similar to the HHI, the CR2 measure is non-technical and requires only limited data for its computation. It measures the total market share (x) of the two largest banks within the sector.

$$CR2 = \sum_{i=1}^{2}(x_i) \quad (2)$$

Using this measure, it was observed that the Jamaican banking system is fairly concentrated. In particular, for the review period, the CR2 measure averaged 60.3 per cent and ranged between a high of 70.9 per cent and a low of 55.7 per cent (see **Figure 2.0**).[9]

Non-Structural Measures

The two ***non-structural measures*** utilized in this study are the Lerner Index and the H-statistics. Higher values of the Lerner Index implies lower competition while higher values of the H-statistics implies more competition.

- Lerner Index Measure

The Lerner Index (LI) measures the markup of output price over marginal cost or the extent to which price exceeds the marginal cost, thus measuring the market power. That is, it captures the difference between price and marginal cost divided by price. A lower Lerner index value corresponds to a lower markup and less pricing power, indicating a higher degree of bank competition. According to Rungcharoenkitkul (2015), this pricing-power

[8] The HHI varies between zero and 10 000 with higher values indicating more concentrated banking systems. According to the U.S Department of Justice, an HHI value less than 1 500 index points reflects a competitive market place. However, an HHI ranging between 1 500 and 2 500 index points is indicative of a moderately concentrated industry.

[9] According to Rodriguez et al. (2018), if the concentration index of the five largest banks is lower than 50.0 per cent, then it is considered that the banking sector is competitive.

proxy may capture the notion of bank competition in the model more accurately than bank concentration. The Lerner index is calculated as follows:

$$LI_{it} = \frac{P_{it} - MC_{it}}{P_{it}} \quad (3)$$

Where P_{it} is the price of banking outputs (proxied by the ratio of total operating income to total assets) for bank i at time t, and MC_{it} is the marginal cost for bank i a t time t. MC_{it} is derived from the estimation of a translog cost function with one output (total assets) and two input prices (price capital, and price of borrowed funds). The cost function is specified as follows:

$$\ln TC_{it} = \alpha_{0+}\alpha_1 lny_{it} + \frac{1}{2}\alpha_2\ (lny_{it})^2 + \sum_{j=1}^{2}\beta_{j,it}\ lnw_{j,it} + \sum_{J=1}^{2}\sum_{K=1}^{2}\beta_{jk,it}\ lnw_{j,it}\ lnw_{k,it} + \sum_{j=1}^{2}\gamma_{j,it}\ lny_{it}\ lnw_{j,it} + \varepsilon \quad (4)$$

where TC_{it} denotes total cost for bank i at time t, y total assets for bank i at time t and w_{jk} represents the two input prices below:

- w_1 price of funds: interest expenses to total deposits.
- w_2 price of capital: non-interest expenses to fixed assets.

The estimated coefficients of the cost function are then used to compute the marginal cost which is expressed as:

$$MC_{it} = \frac{TC_{it}}{y_{it}}\left(\alpha_1 + \alpha_2\ lny_{it} + \sum_{j=1}^{2}\gamma_{j,it}\ lnw_{j,it}\right) \quad (5)$$

where the derivative of the logarithm of the total cost with respect to the logarithm of output is computed using the cost function specified in equation (4). Once marginal cost is estimated and the price of output is computed, the Lerner Index for each bank can be calculated. A Lerner Index closer to one indicates a higher mark-up of price over marginal

cost and hence greater market power for the firm (Ariss, 2010).[10] Following the work of De Guevara et al. (2007), Maudos and Solis (2011) and Weill (2013) a Lerner Index will be constructed for the market j by averaging the individual Lerner indices as follows:

$$L_j = \sum_{i \epsilon j} \emptyset_{ij} \; L_{ij} \tag{6}$$

where L_{ij} is the Lerner Index of firm i in market or country j and $\emptyset_{ij}$ the weighting of firm i (often the market share of firm i in market j). The mean value of the weighted Lerner Index for Jamaican DTIs over the sample period was 0.35 and ranged between a high of 0.76 index points to a low of 0.08 index points which suggests a moderate level of market power (see **Figure 3**).[11]

- H-Statistic Measure

The H-Statistic (H), based on the Panzar-Rosse model (1987), is the sum of the elasticities of total revenue relative to input prices. A perfect competitive market will have an H-statistic of 1 (H=1) since firm demand is perfectly elastic. For a monopoly, the H-statistic is less than or equal to zero (H≤0) since demand is downward sloping and therefore a change in factor prices will increase marginal costs, reduce output and either lead to no change or a decrease in revenues. In the case of a monopolistic market, the H-Statistic is between 0 and 1 (0>H<1). The H-Statistics is calculated by estimating the equation below:

$$\ln (P_{it}) = \alpha + \beta_j \ln(w_{j,it}) + \beta_k \ln(w_{k,it}) + \gamma \ln(Z_{it}) + \varepsilon_{it} \tag{7}$$

Where P is the ratio of interest income to interest earning assets, w_j is the ratio of interest expense to total deposits, w_k is the ratio of non-interest expense to total fixed assets and Z is a set of specific control variables of the banking sector including deposits to loans, loans to assets, capital to assets and the logarithm of assets. From equation (7), the H-statistic is obtained which is the the sum of the elasticities:

[10] According to Rodriguez et al. (2018), it is not rare for the Lerner Index to show negative values, these may represent periods of super competition and can occur when banks lower their price below the marginal cost.

[11] The Lerner Index generally ranges between zero and one.

$$H = \beta_j + \beta_k \quad (8)$$

Over the sample period, the mean H-statistics was estimated at 0.63 and suggest that the banking sector may be characterized by monopolistic competition.

3.2 Economic Framework

Following the work of Fungáčová et al (2017), the baseline regression (***Equation 9***) is utilized to identify the relationship between competition in the banking sector and cost of credit, which is the main interest of this paper:

$$r_{it} = \alpha + \beta X_{it} + \gamma Z_t + Competition_t + \theta_i + \varepsilon_{it} \quad (9)$$

where r_{it} is the lending rate for bank *i* at time *t;* X_{it} is a vector of bank specific explanatory variables (size, overhead expense ratio); Z_t represents country level variables including GDP per capita, 6-month Treasury bill rate, and stock market development. Competition is denoted by one of the four competition measures utilized in the study (CR2, HHI, Lerner Index and the H-statistic); θ_i captures individual unobserved effects and ε_{it} is the random error term. The baseline model was augmented by including a lagged value of cost of credit to capture persistence overtime.

$$r_{it} = \alpha + \delta r_{it-1} + \beta X_{it} + \gamma Z_t + Competition_t + \theta_i + \varepsilon_{it} \quad (10)$$

Based on ***Equation 10***, r_{it-1} represents one period lagged cost of credit and δ is a scalar.[12] The Generalized Method of Moments (GMM) technique proposed by Arellano and Bond (1991) will be used to estimate the model. This method is useful in providing unbiased and efficient estimates in dynamic models which have lagged endogenous variables as regressors. Another important advantage of the GMM methodology is that it accounts for the possibility of correlations between the independent variables (Baltagi, 2001).

[12] A value of δ between 0 and 1 implies persistence in the cost of credit variable, but will eventually return to its normal level.

In order to ensure the reliability of the results of this study, several models were estimated using various bank specific and macroeconomic factors as instrumental variables. The most robust models for each competition measure were selected. The models were selected based on the results of the panel unit root test on the residuals of the GMM model for each competition measure. Other robustness measures examined were the Sargan test statistic for validity of instruments, significance of parameters and appropriateness of sign, R-Square values and the size of Durbin Watson test statistics.[13] **Table 4** provides the results of the unit root tests considered most appropriate for panel data analyses. These include *Levin Lin Chu*, *Im Pesaran Shin* and *Fisher Augmented Dickey Fuller* unit root tests. The results of these tests showed that the residual for the four models were stationary indicating nonspurious regression results (see **Table 4.0**). The results of the Sargan test, which was used to evaluate the validity of the instruments utilized in the regressions, showed no evidence to reject the null that 'over-identifying restrictions are valid, which suggest that the instruments used in the models are valid. Additionally, most of the variables were significant and demonstrated the expected signs.

4.0 Results

The results of the GMM model for each competition measure, shown in **Table 3.0**, are generally consistent with *a priori* expectations. Of note, with the exception of the H-statistics, higher values of these measures are associated with lower levels of competition and consequently higher cost of credit. Based on the results, the effect of competition on cost of credit largely supports the predictions of the market power hypothesis, which posits that bank concentration is positively associated with cost of credit. Specifically, we observed that the coefficients are significant and positive for the CR2, HHI and Lerner Index measures. Regarding the coefficient of the H-statistics, the coefficient was negative and insignificant. The results for the four competition measures indicate that greater bank competition decreases the cost of credit. Of importance, both structural and non-structural indicators lead to the same inference, suggesting that measuring competition with or

[13] Correlation analysis was also conducted to minimize the likelihood of multi-collinearity while at the same time eliminating insignificant variables from the results.

without explicit information about market structure does not change the impact of bank competition on the cost of credit.

In examining the economic significance of the main results reported in **Table 3.0**, we consider a one standard deviation (i.e., 0.1) change in the Lerner Index, based on the size of its coefficient. Specifically, if the Lerner index changes by one standard deviation, then the cost of credit changes by 0.014*0.1 = 0.001, representing a 0.8 per cent change from the mean value of cost of credit. Therefore, the effect of the competition on the cost of credit is economically meaningful, especially as it relates to the Lerner Index measure.[14]

Regarding the institutional and economic development variables included in the regression models, the results showed that all these factors have a statistically significant impact on cost of credit. In particular, the findings revealed a positive relationship between firm size and overhead expenses. This is in line with the expectation that larger firms would have greater concentration of loans which would encourage less competitive pricing strategies. Moreover, higher overhead expenses or cost incurred by banks in order to maintain their operations is indicative of increase inefficiencies which oftentimes results in increase cost of credit.

As it relates to measures of economic development, GDP per capita showed a negative relationship with cost of credit. This is consistent with the fact that as the economy grows and develops, competition among financial institutions may intensify which would result in increased credit expansion and consequently lower cost of credit. Furthermore according to Fungáčová et al (2017), access to credit is easier in more financially and economically developed economies and is usually more restrictive in less developed economies. Additionally, based on the study, higher Treasury bill rates have a positive and significant association with cost of credit. This is in line with economic theory as Treasury bills are typically used as benchmarks for other interest rates especially in developing economies. Growth in the JSE Main Index showed a significant and positive relationship with cost of

[14] Fungáčová et al (2017) utilized this type of analysis to examine impact of competition on cost of credit.

credit. This indicates that greater stock market development in the Jamaican economy is expected to increase GDP growth as well as demand for credit which consequently results in an increase in cost of credit especially for riskier enterprises.

Additionally, the persistence of the cost of credit variable is confirmed by the highly significant and positive coefficient on the lagged endogenous variable, average weighted lending rate (*AWLR(-1)*). Notably, the coefficient is above 0.90 for each model and is indicative of cost of credit being highly persistent overtime.

5.0 Conclusion and Policy Implications

Given the prominent role of the banking sector in the Jamaican financial system, it is importance for BOJ to monitor the degree of competitive behavior within this sector. A more competitive banking system is expected to reduce bank loan rates, which would add to the welfare of households and performance of corporates. The empirical findings from this paper showed that bank competition does in fact impact cost of credit. Therefore, in order to ensure that policy rates are being transmitted efficiently to market loan rates, policymakers should continue to encourage competition by promoting and maintaining a low interest rate environment. Furthermore, policies geared towards a reduction of banks' reliance on interest income from government debt and more towards core business activities can also result in increased competition and lower market loan rates.

It is also important to ensure that the regulatory framework encourages new products and innovations as strong restrictions on new products and services will lead to reduced competitiveness in the banking system. Additionally, BOJ can further promote the use and development of credit bureaus in Jamaica as the increased availability of accurate and reliable information on borrower's ability to pay reduces credit risk and lending rates. Competition can also be enhanced by increasing access to financial services through promoting greater use of mobile and agent banking in the Jamaican economy. BOJ can also boost competition by increasing customer awareness as it relates to service fees and charges

by individual banks by circulating this information via social media. [15] Policy makers can further facilitate the ease at which customers can switch accounts between banks so as to encourage more competition within the sector.

Notwithstanding, intense bank competition can result in credit booms which may ultimately threaten financial system stability. Therefore, the necessary macroprudential policy and tools must be in place to limit any systemic risk which may arise from an increase in competition.

[15] Since 2010, the Bank of Jamaica commence data collection of fees and charges of banking services from DTIs which is published annually on its website.

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Appendix

FIGURE 1: COMPARISON OF THE BANK OF JAMAICA'S POLICY RATE AND THE AVERAGE WEIGHTED LENDING RATES OF DEPOSIT TAKING INSTITUTIONS (2000-2018)

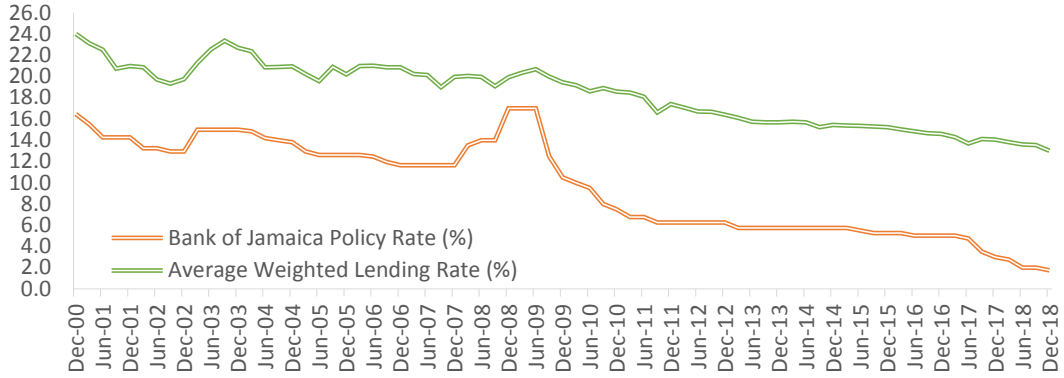

FIGURE 2: TREND IN STRUCTURAL COMPETITION MEASURES FOR DEPOSIT-TAKING INSTITUTIONS IN JAMAICA (2000-2018)

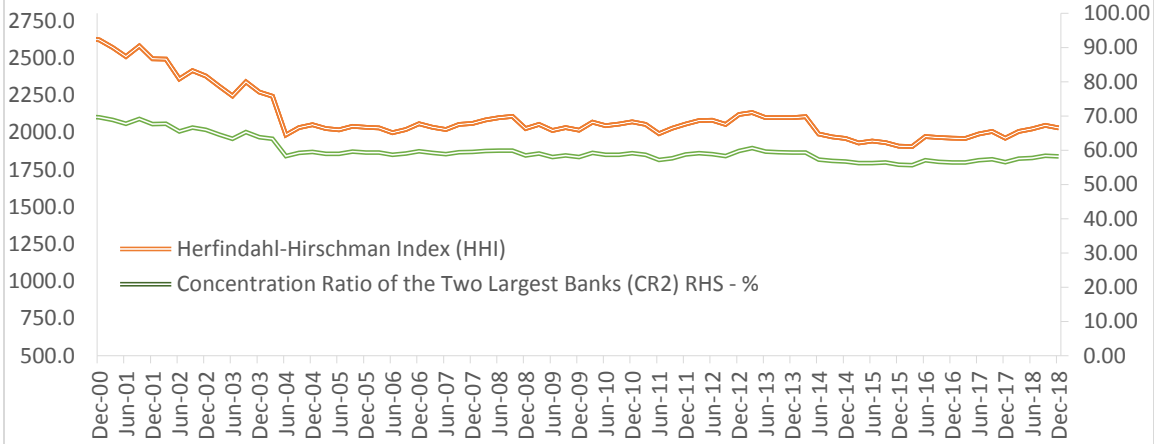

FIGURE 3: TREND IN NON-STRUCTURAL COMPETITION MEASURE FOR DEPOSIT-TAKING INSTITUTIONS IN JAMAICA

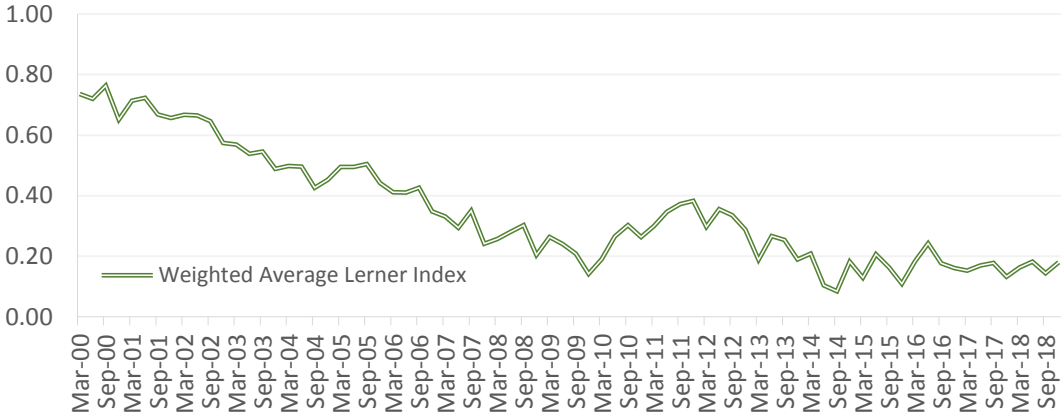

Table 1.0 List of variables

Variables	Definition
Bank Specific	
Cost of credit	Average interest rate charge on various categories of loans including mortgages, personal and corporate.
Firm size	Measured as the log of total assets.
Overhead expense	Ratio of noverhead expense to total assets.
Macroeconomic	
GDP per capita	Nominal GDP divided by the population size.
Treasury bill	This represents the 6-month treasury bill rate.
Stock market development	Meaused as growth in the JSE Main Index.
Competition Measures	
HHI	Sum of the squares of market share for all banks in the industry, where the total assets of each bank is used to calculate market shares.
H-statistic	The H-Statistic (H), based on the Rosse-Panzar model, is the sum of the elasticities of total revenue relative to input prices.
CR2	CR2 measures the total market share of the three largest banks of the sector.
Lerner Index	Measures the markup of output price over marginal cost or the extent to which price exceeds the marginal cost, thus measuring the market power.

Table 2.0 Descriptive statistics

Variables	Expected sign	Obs.	Mean	Min	Max	Std. Dev.
Cost of credit *(dependent variable)*		836	16.82	5.90	42.70	5.48
Bank Specific						
Firm size	+/-	836	7.42	5.63	8.76	0.68
Overhead expense/total assets	+	836	0.71	0.02	2.41	0.34
Macroeconomic						
GDP per capita	+/-	836	391,956.2	129,362.0	742,516.3	183,034.9
Treasury bill	+	836	11.57	1.87	33.47	6.04
Stock market development	+/-	836	19.42	-26.45	112.06	30.29
Competition Measures						
CR2	+	836	60.31	55.65	70.85	3.97
HHI	+	836	1806.05	1632.34	2005.88	126.60
Lerner Index	+	836	0.20	-1.00	0.70	0.24
H-statistic	-	836	0.44	0.10	0.78	0.31

Notes:
1. 'Obs.' denotes the number of observations fo the respective variable. The last four columns show the mean, minimum, maximum and standard deviation of the sample.

Table 3.0 Results of the Main Estimations

Depedent Variable = Cost of Credit				
	CR2	HHI	Lerner Index	H-Stats
Cost of Credit (-1)	0.982***	0.977***	0.931***	0.938***
	(0.022)	(0.022)	(0.013)	(0.011)
Competition	0.093***	0.002**	1.376**	-0.034
	(0.036)	(0.001)	(0.713)	(0.419)
Size(-1)	3.968***	3.734***	2.132***	1.962***
	(0.996)	(0.993)	(0.443)	(0.366)
Overhead Expense	1.486***	1.409***	0.675***	0.669**
	(0.515)	(0.507)	(0.394)	(0.339)
GDP Per Capita (-1)	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Treasury bill rate	0.050***	0.051***	0.043***	0.051***
	(0.005)	(0.005)	(0.006)	(0.006)
Stock Market Development	0.004***	0.004***	0.004***	0.005***
	(0.001)	(0.001)	(0.001)	(0.002)
Adjusted R^2	0.93	0.93	0.93	0.94
J-Statistic	12.94	12.94	11.47	21.2
Sargan Test	0.79	0.79	0.87	0.27
Durbin-Watson	2.2	2.2	2.1	2.4
Instrument rank	36	36	36	36
Observations	792	792	792	792

Dynamic Panel GMM estimations with competition measure indicated at top of column. Standard errors (in parenthesis) *, **, and *** denote an estimate significantly different from 0 and the 10%, 5% and 1% levels, respectively. Variable definitions are provided in the Appendix.

Table 4.0 Unit Root Results for the Residuals of the Four Regression Models

Models	Levin Lin Chu	Im Pesaran Shin	ADF - Fisher Chi-square	PP- Fisher Chi-square
Model 1 - CR2	-2.98105***	-9.45205***	140.481***	'282.309***
Model 2 - HHI	-2.94001***	-9.65603***	144.06***	'282.297***
Model 3 - Lerner Index	-1.17334***	-7.74185***	120.059***	'233.392***
Model 4 - H-statistics	-3.43926***	-11.3964***	173.74***	'270.154***
Cross Sections	11	11	11	11
Observations	759	759	759	781

Notes:

1. *, **, and *** denote an estimate significantly different from 0 at the 10%, 5% and 1% levels, respectively.

2. Under the null hypothesis, the test statistic is asymptotically disturbed according to the standard normal distribution. Probabilities for Fisher tests are computed using an asymptotic chi-square distribution. All other tests assume asymptotic normality.