

Financial Stability in a Moderately Competitive Banking Market: Evidence from the Sri Lankan Banking Sector

H.D.D. C. Liyanagamage

Department of Management Studies, Open University of Sri Lanka
hdcha@ou.ac.lk

Abstract

Banks in the developing countries are competing in an environment where the financial infrastructure or the prerequisites for such competition is lacking. Therefore there is a current debate in banking literature regarding the effect of bank competition on the stability of the banking sector. The present paper provides new and rather scarce evidence of effects of banking sector competition on financial stability of the Sri Lankan banking sector during the period 1996 to 2010. By analyzing a comprehensive set of panel data the study reveals that the Sri Lankan banking sector is moderately competitive as per Panzar and Rosse H-Statistic and, highly unstable as per Z- score. The results of the core analysis provide evidence for a U shape relationship between competition and stability in the Sri Lankan banking sector during the sample period. Hence, a different approach emerges, with underdeveloped countries giving a stronger role to competition authorities to understanding the complex relationship between competition and stability in the financial sector.

Keywords: Bank Competition, Financial Stability, H-Statistic, Banking Sector, Panel Data

1. Introduction

Since the seminal work of Mackinnon - Shaw (1973) a number of under developed countries in South America, Africa and Asia that were regarded as repressed economies in terms of financial policies, undertook financial liberalization measures. Sri Lanka has not been an exception. A series of financial sector reforms, along with the economic liberalization policies were introduced in 1977 which lead to bank competitiveness. Technological innovations and policy measures taken over the past few decades have resulted in

achieving current level of growth and prosperity experienced by emerging economies (Guzman, 2000). Thus, new developments in information technology and further progress in liberalization and harmonization of the financial markets have strongly affected the financial environment in which financial intermediaries operate today. These contributions in financial market development, together with the entry of new types of competitors and entry of foreign banks in to local operations are likely to have contributed to banks' competitiveness in the era of globalization (Guzman, 2000).

However, in recent years, many theoretical and empirical works have marked a substantial convergence of research interest opening a debate on the economic role of competition in the banking industry. Traditional Industrial Organization models¹ such as Klein (1971), predict that restraining competitive forces should unequivocally produce welfare losses. Therefore increased competition in the financial sector can be vital for access of firms and households to financial services and external financing, in turn affecting bank efficiency and overall economic growth.

Though competition is generally good, there is a trade-off between competition and financial market stability when it comes to banking. This is due to the unique features of the banking system such as increasing returns to scale, asymmetric information, and liquidity and complexity issues. Therefore there is a current debate in banking literature regarding the effect of bank competition on the stability of the banking sector. The conflicting theoretical and empirical findings suggest the need for empirical investigations on the issue in unique settings. The present study is an effort to investigate bank competition and its

¹ Industrial organization (or industrial economics) is the subject which is concerned with the workings of markets and industries, in particular the way firms compete with each other.

effect on financial stability in one such unique setting; i.e. in the context of commercial banking sector of Sri Lanka.

2. Literature Review

Banks are potentially more vulnerable to instability. Also, instability in the banking system can have more debilitating effects than instability in other industries. Therefore, there has long been a view that market power is necessary to ensure stability in banking. The review of the existing theoretical studies allows identifying an economic rationale for stability concerns of policymakers. There are three opposing views in the literature regarding the effect of competition on the stability of the banking system; they are competition fragility view, competition stability view and a view highlighting multifaceted relationship.

Competition - fragility view is the traditional view on effects of bank competition on financial stability. Under competition- fragility view (Marcus 1984, Keeley, 1990) competition is considered as undesirable as far as stability in the banking sector is concerned. This view states that as the banking system becomes more competitive and less concentrated, it becomes more fragile and less stable. There have been many theoretical studies in the literature which support the predictions of competition-fragility view. The dominant perception in the literature which supports competition-fragility view is “franchise value paradigm”. Simply stated the idea is that, in a less competitive bank market, banks limit their risk-taking in order to protect the quasi-monopoly rents granted by their government charters. Accordingly more bank competition erodes market power, decreases profit margins, and results in reduced franchise value. As a result the bank is encouraged to take on more risk to increase returns (Marcus 1984, Keeley 1990). The dominant view here is that franchise value plays a key role in limiting the riskiness of individual banks and hence of banking systems

more broadly. They limit or reduce their risk-taking and become relatively conservative in order to protect their franchise values. Thus, these banks tend to behave more prudently by holding more equity capital or less risky portfolios which in turn contribute to the stability of the whole banking system (Keeley, 1990, Jemeneze et al, 2007).

Another argument brought forward to support competition-fragility view is an illustration of the relationship between the degree of competition and regulations and supervision of banks by the authorities. When the number of banks in the industry is smaller it is easier for authorities to closely supervise the banks and is able to prevent banks from excessive risky activities (Beck, 2008). Hellman et al (2000), further show that capital requirements, deposit ceiling rates are still important in preventing banks from excessive risk taking activities. The importance of increased diversification of activities on lowering the riskiness of profits and thus less prone to failure has also being discussed as another theoretical argument that supports the competition- fragility view. This diversification effort in turn leads to more stability.

In addition, according to Allen and Gale (2004), when the competition among banks increases, banks have a minimum incentive to properly screen their borrowers, as the banks earn only little informational rent from the relationship with their borrowers. This again increases the risk of fragility. Another channel which affects the fragility in a competitive banking environment is inter-bank market and payment system. Banks in a highly competitive banking industry are price takers. Therefore there is no incentive to provide liquidity to a bank troubled with a temporary liquidity problem (Allen and Gale, 2000). This will then cause the failure of the troubled bank ultimately affecting the system as a whole.

Competition - Stability View is the opposite view emerged in recent literature through which traditional competition-fragility view was challenged. This view states that high competitive markets are more stable (Stiglitz and Weiss, 1981; Boyd and De Nicolo, 2005; Beck, 2008). Or in other words financial instability increases as the degree of competitiveness is lessened. Competition-stability view is basically founded with the arguments brought forward by risk shifting paradigm. This paradigm is focused on moral hazard and adverse selection problems. Stiglitz and Weiss (1981) show, in their theoretical model, that the moral hazard and adverse selection problems increase the risk of loan portfolio in a lower competitive market. This is because, the higher interest rate formed in the lower competition discourage safer loan customers from borrowing. This will also induced other borrowers to choose riskier projects and hence are likely to face a higher probability of default. The volume of nonperforming loans would then increase, adding to the bank's risk exposure and undermine financial stability (Berger et al., 2008).

Boyd and De Nicolo (2005) further confirm this relationship and find a monotonic declining relationship between competition, measured as the number of banks lending in a market, and bank risk; that is, as the number of banks and competition increases, the level of bank risk would decline. Unlike in traditional studies which ignore the impact of competition or concentration in the banking sector on borrowing firms' behaviour, Boyd and De Nicolo's (2005) model incorporate both aspects. As competition declines, banks earn more rents in their loan markets by charging higher loan rates. Though higher interest rates increase the expected rate of return on bank assets, it in turn increases the standard deviation of those returns in a moral hazard and adverse selection environment. This is because, increased loan rates, makes it harder for borrowers to repay loans and then increases moral hazard incentives to shift into riskier projects.

The second argument that supports the competition-stability view is “too-big or too important to fail” policies. When the banking system is comprised with few larger bank firms the policy makers have to concentrate on more the failure in the financial system. The reason is that the presence of larger banks constitutes a potential threat to the safety and soundness of the financial system. Therefore regulators are usually reluctant to let the larger banks to fail in solvency problems as it creates countrywide problems. Governments in more concentrated banking systems therefore have “too-big-to fail” or “too important to fail” policies to safeguard the potential negative effects failing of banks. Under these policies, governments give larger banks insurance subsidies larger than those given to the smaller banks. However the subsidies and government safety net in turn give an incentive to the banks to behave in more risk taking manner as they are in the belief that they are too important to fail and thus are protected by the government. From this perspective, concentrated banking systems may lead to more risk taking and tend to be more fragile than a competitive banking system with many small banks (Beck et al., 2006b; Beck, 2008).

The final argument which advocates competition-stability view is on regulation and supervision of the banking system. The proponents of this argument show a contradictory effect than how it had been predicted in traditional competition-fragility view. According to their argument, when the bank size is larger due to more concentration or more consolidation activities, it becomes harder and complex for the regulatory authorities to regulate and supervise those banks (Beck, 2008).

The view highlighting multifaceted relationship: The contemporary view however predicts neither direct positive nor a direct negative effect of bank competition on the financial sector stability. Thus, according to Matutes and Vives (1996) competition per se, does not need to create instability. They argue

that bank vulnerability to operate can emerge independently of competition in any market structure. The probability of bank failure is endogenously determined due to many reasons such as self fulfillment expectations and coordination problems among depositors etc. Allen and Gale (2000, 2004) show that different models can provide different results regarding the trade-off between banking competition and stability. Because of the differences in the measurements and assumption made by these models, contradictory relationship between competition and stability has been found.

Further, some models have focused only on one aspect of risk and have made conclusions. For example, though the findings of Jimenez, Lopez and Saurina (2007) study support the franchise value paradigm and do not provide evidence for the risk shifting paradigm, their study only considers loan portfolio risk and does not examine the risk of the bank; as a result, it does not provide evidence on overall bank risk or financial fragility. Therefore, the proponents of this view show that the relationship between competition and stability is not straight forward as explained in both competition-fragility and competition stability views.

Recently an interesting model was presented by Martinez-Miera and Repullo (MMR 2007). They identify that, in a lower competitive environment a risk-shifting effect accounting for more defaults when interest rates increase. However they realize that, at the same time, there is a margin effect that generates more revenue for the bank coming from those non defaulted borrowers who pay a higher interest rate. Therefore in their model, the relation between competition and stability can be U-shaped; that is, as the number of banks increases, the probability of bank default first declines but increases beyond a certain point (MMR 2007).

3. Objectives

The competition-stability view basically supported with the risk shifting paradigm together with the above discussed theoretical arguments, predicts a positive relationship between the degree of competition and the stability in the financial system. Both of these theories, competition-stability and competition-fragility, address the issue focusing only on one aspect at a time. Whether it is franchise value or risk shifting effect or regulation and supervision or any other factor, the same effect cannot be expected in all economies as well as over the time.

Moreover, the cause and effect relationship could not be necessarily common. The reason is that the banking systems have developed in different ways among countries, for a variety of reasons. However the trend is towards more diversified banking activities as a result of liberalization policies. In this dynamic process the success and failure would depend on a variety of reasons. For instance, capability of management of individual banks and effective supervision of central banks are crucial factors that affect bank stability. In addition to that, macro-economic instability, inadequate control systems, operational failures and fraud, are some other causes that have not been adequately addressed in the theoretical stance. Therefore, whether bank competition creates financial instability in the banking sector from the theoretical perspective is more complex and even more dynamic. Therefore this needs to be analyzed in unique settings. The present paper attempts to analyze the stability of bank competition in Sri Lanka.

Thus, the overall objective of the study is to examine empirically whether the relationship between bank competition and stability in the Sri Lankan banking sector is linear, as suggested by both franchise value and risk-shifting models, although with opposite signs, or is U-shaped, as in the MMR model. This broader objective is supplemented by a three specific objectives as; first is to understand

the degree of competition among the commercial banks in Sri Lanka. Second is to analyze the nature and the magnitude of the financial stability of the Sri Lankan banking sector. And third is to examine econometrically the nature, and the intensity of the effect of bank competition on the stability of the banking sector.

4. Methods

The study employs a new empirical industrial organization approach to assess whether any deviations in stability of the banking sector can be attributed to bank competition in Sri Lanka. Following Martinez-Miera and Repullo (2007), non linearity between competition and efficiency in banking is allowed in this study. Specifically, model of the stability- competition relationship developed in this study can be elaborated as follows:

$$Stability_{it} = f(Competition_t, Competition_t^2, BusinessEnvironment_{it})$$

----- (Equation1)

In the above model Stability is the financial soundness of the bank which shows banks vulnerability to instability. As the model shows, the stability is a function of bank competition and the business environment. The model sets the relationship between the specified bank stability measure and the specified bank market competition measure, controlling for business environment with bank characteristics and the state of the business cycle. The elaborated model of Equation 1 is shown as Equation 1a.

$$Stab_{it} = \alpha_{it} + \beta_1 H_t + \beta_2 H_t^2 + \beta_3 MS_{it} + \beta_4 Crgr_{it} + \beta_5 Eff_{it} + \beta_6 CrPvt_t + \beta_7 TAg_r_t + \beta_8 GDP_t + \beta_9 RInt_t$$

----- Equation (1a)

The Equation 1a was estimated as a panel data regression with bank specific fixed effects. Assuming the correlation of a time series with its own past and future values in bank revenues, Estimated Generalized Least-Squares

(EGLS) procedure was followed. In the EGLS procedure, the estimation was done with the cross section weights, which corrects for the presence of cross-section heteroskedasticity. In the regressions, key exogenous variable is the degree of bank competition measured with PR H statistics. In this model the nonlinear relationship of competition on stability is allowed.

Miera and Repullo (MMR 2007) identified that, in a lower competitive environment, a risk-shifting effect accounts for more defaults when interest rates increase. However, the present study assumes this effect would be higher when the bank managers face a tougher competition, as the probability of adverse selection increases with competition. At the lower level of competition, the probability of adverse selection is low. Therefore, contrarily to Miera and Repullo (MMR 2007), the present study assumes the relation between competition and stability can be U-shaped; that is, as the competition increases, the probability of bank default first declines but increases beyond a certain point.

The GLS estimator is also controlled for bank specific, industry specific and macro-economic environment. In order to control for bank specific effects, the study uses relative market share of individual bank (individual share of bank loans to the total loans of the banking sector), the size of the bank (measured with Log value of the individual bank's total assets). The reason for incorporating these two variables is to see whether larger banks are likely to be subject to regulators' 'too-big-to-fail' policies. Though there is no consensus about the sign of the effect both variables affect the intensity of risk exposed by the bank. Credit growth of the individual bank has also been incorporated to see whether highly growing banks are more vulnerable to instability. Usually, banks risk taking behavior changes with the growth prospects. The effect of credit growth on stability has also been analyzed and confirmed in previous studies (Schaeck and

Cihak, 2008). Also, bank efficiency scores (measured with Data Envelopment Analysis) were included to test whether more efficient banks are more stable.

The *Equation 1a* also controlled for industry specific effect by incorporating two more variables. They are credit to private sector by the commercial banks and development in the banking sector. Credit to private sector is also a measure of banking sector development and allocative efficiency. This in turn indicates moving banks' loan market from risk free government loans. Therefore this could directly or indirectly affect banks soundness. The assets growth of the banking sector on the other hand is an indication of banking sector development. The aim of including this variable is to test any effect of banking sector's growth prospects on bank instability. Hence, these two variables capture any effect at industry level on bank stability. As in the case of competition efficiency model, here too macro-economic effects are controlled with per capita GDP and real interest rate.

4.1. Measuring bank competition

Panzar and Rosse (1987) define a measure of competition, the H as the sum of the elasticities of the reduced-form revenue function with respect to factor prices. According to them, this statistic can reflect both the structure and the conduct of the market to which the firm belongs; it represents the percentage variation of the equilibrium revenue derived from the unit percent increase in price of all factors used by the firm. The present study estimates the PR model using the following, reduced form revenue equation. Assuming an n-input single-output production function, the empirical reduced-form equation of the P-R model is written as;

$$\log TR = \alpha + \sum_{i=1}^n \beta_i \log W_i + \sum_j \lambda_j \log CF_j + e \text{ ----- (Equation 2)}$$

Where TR denotes total interest revenue, W_i the i -th input factor, and CF other firm-specific control factors. Panzar and Rosse (1987) show that the sum of input price elasticities, $H = \sum_{i=1}^n \beta_i$ reflects the competitive structure of the market. In this study, banks are considered as employing three factor inputs namely labour, funds, and capital. The above econometric model also includes a set of exogenous and bank-specific variables that may shift the revenue schedule. Accordingly, the equation (2) can be rewritten as;

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

Where R_{it} is the ratio of gross interest revenue to total assets (proxy for output price of loans), IPL_{it} is the ratio of personnel expenses to total assets (proxy for input price of labor), IPF_{it} is the ratio of interest expenses to total deposits (proxy for input price of deposits), and IPC it is the ratio of other operating and administrative expenses to total assets (proxy for input price of equipment/fixed capital). Equation (2a) also includes a set of exogenous and bank-specific variables that may shift the revenue schedule. Specifically, TA_{it} (total assets) of the bank was incorporated to control for potential effects of size on interest revenue. Another control variable is NPL. If the non-performing loans are kept existing and continuously rolled over, the resources are locked up and banks' ability to earn interest would be low.

Assuming this effect on interest revenue of the bank, NPL was incorporated in the model as a control variable. The definition of NPL_{it} of this study is, the ratio of non-performing loans to gross loans of the bank. The ratio of the number of branches of a bank to the total number of branches (BR) represents another useful proxy for evaluating the effect of bank size on revenues, thus identifying possible scale economies. Its sign will be positive or negative

depending on whether differences between the banks, driven by their branch networks, lead to higher or lower revenues. This variable is particularly useful in the Sri Lankan context because banks, especially state-owned banks, have large branch networks. All of these variables are in logs, with the coefficients representing their respective elasticities. In addition, a dummy variables (DV) was included for foreign-owned banks.

The P-R revenue equation is easy to estimate by means of regression, with only few explanatory variables. Since the P-R model involves only firm-level data, it is robust to the geographic extent of the market. As the differences among banks need to be analyzed, the study used the PR approach. The Panzar-Rosse approach estimates the sum of elasticities (H statistic) of a firm's revenue with respect to input prices in a reduced form revenue equation. The measure is grounded in the idea that competitive firms are price takers and must pass through cost changes to customers, while a monopoly can vary output to maximize profits in the face of higher input prices. It investigates the extent to which a change in factor input prices is reflected in (equilibrium) revenues earned by a specific bank.

4.2. Measuring Stability

In the empirical analysis to investigate the effect of bank competition in financial stability, the study focuses on individual bank stability rather than systemic stability. To proxy bank's financial Stability, the study uses the Z-Score which combines several of the most significant variables in a statistically derived combination. Hence it provides useful interpretation about the overall risk of a firm. Z-score is calculated as;

$$Z = \left(\frac{ROA + E / A}{\sigma ROA} \right) \text{----- (Equation 3)}$$

Where ROA is the bank's return on assets, E/A is its equity to asset ratio and σ_{ROA} is its standard deviation of return on assets computed over the sampling horizon. Unlike a single financial ratio, this index combines in a single indicator of the profitability, capitalization level or leverage, and return volatility. The Z-Index increases with profitability and capitalization level and decreases with return volatility of assets. Thus, a larger value of Z-Index indicates a smaller risk profile for a bank and higher bank stability. This has been extensively used in recent banking studies to measure bank stability or bank risk (Schaeck and Cihak, 2008, Berger et al, 2008).

4.3. Estimation procedure and the data set

This research is based on both micro and macro level analysis in order to analyse the implications of bank competition on financial stability during the period 1996 to 2010. In order to see the relationship between bank competition and banking sector variables, the study applies three major steps in analysis. Initially the measure of bank competition for the country is developed. For this, Panzar-Ross approach is modified by considering the Sri Lankan banking market. In the second step, the degree of financial stability is estimated by using Z score). The third step focuses on the empirical test to see the effects of bank competition on banking sector stability.

As the purpose of the study is to investigate the stability of bank competition in Sri Lanka, both accounting data and macro data are employed. In terms of bank types, the study only considers commercial banks and excludes saving banks from the sample. Therefore the sample covers the 22 banks in the commercial banking sector. This includes 11 local banks and 11 foreign banks operating in Sri Lanka. The study uses an extensive bank level set of panel data and macro data for the 15 years from 1996 to 2010. The unavailability of past bank level data limited the study's time horizon for a period of 15 years. The

main sources of data are the Annual Reports of individual banks and Annual Reports of the Central Bank of Sri Lanka.

5. Findings and Discussion

5.1. The degree of competition in the Sri Lankan banking sector

As the results of the estimated reduced form revenue equation shows above, the estimated H -statistic is 0.55 for the sample period (see Table 1). This value does not lend support for a perfectly competitive banking market in Sri Lanka, as the estimated H statistic significantly differs from 1. This value is also significantly non-negative (closer to zero), thus offers no evidence for a monopoly in the banking market. The results suggest that for the observed period, the Sri Lankan banking sector is characterized by monopolistic competition according to the PR classification.

This indicates that an increase in input prices will lead to a less than proportional increase in revenues, as the demand for banking facing individual banks is inelastic. As this value is in the range between 0.5 and 1, the estimated H statistic supports evidence for a moderately competitive market in the Sri Lankan banking industry. This result is quite similar to the H statistic estimated by Bikker et al (2006a). They use the P-R model to provide H values for 101 countries over 1996-2004, based on 25,000 banks. In their study, the estimated H statistic for Sri Lanka was reported as 0.69 for the period 1994-2001. The estimated H statistics of the present study was 0.68 for this particular period (1996-2004).

Table 1: Equation 2b - Test of competitive conditions of Sri Lankan banking sector

$\log TR_{it} = \alpha + \beta_1 \log IPL_{it} + \beta_2 \log IPF_{it} + \beta_3 \log IPC_{it} + \lambda \log TA_{it}$ <p>Log TRit = - 0.342 + 0.23 log IPLit + 0.31 log IPFit + 0.007 log IPCit + 0.02log TAit (-5.56)*** (10.76)*** (20.09)*** (1.78)** (2.19)***</p> <p>with adjusted R2 = 0.72 F-statistics = 202.63*** Durbin-Watson stat for serial correlation = 1.97</p> <p>$H = \sum_{i=1}^n \beta_i$ H = $\beta_1 + \beta_2 + \beta_3$ H = 0.23 + 0.31 + 0.007 H = 0.55</p>
--

Source: *Author constructed*

Notes: logTR is the dependent variable in the P-R regression. TR is the gross interest revenue to total assets. IPL= ratio of personnel expenses to total assets, IPF= ratio of interest expenses to total deposits, IPC= ratio of other operating and administrative expenses to total assets, TA=total assets, NPL =ratio of non- performing loans to gross loans. t values for coefficient are in parentheses. ***, **, and * indicate a significant difference from zero at 1%, 5%, and 10%, respectively.

In addition to panel regression above, time series estimates of the H statistic from 1996 to 2010 were generated by EGLS regressions of equation 2a to assess the change of H statistic over the sample period. In OLS procedure the study used White diagonal standard errors and covariance to address any heteroskedasticity across the sample banks. The H statistic estimates over the stages move around 0.49 to 0.67 between 1996 and 2010 and do not have a persistent upward or downward trend. Rather it shows cyclical movements along the sample period. This particular pattern of competition in Sri Lankan banking industry can be further illustrated by using figure 1.

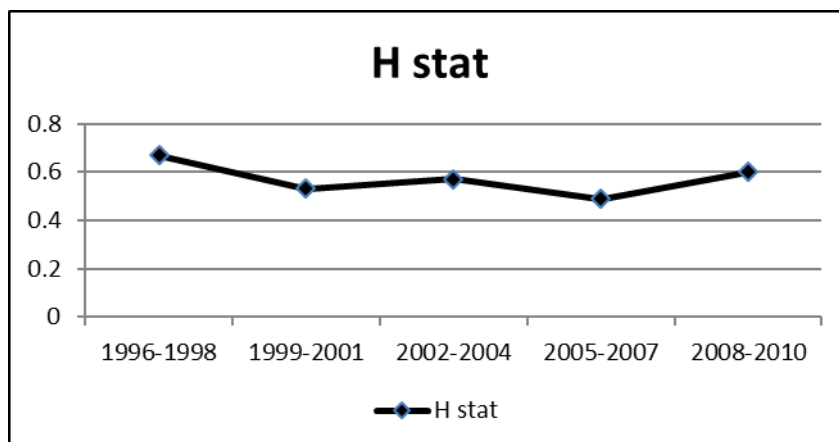


Figure 1: Trends in observed competition measure of Sri Lankan banks 1996-2010

Source: *Author*

Several striking features of the estimation outcome should be highlighted. First, according to the estimated annual H statistics, the degree of bank competition during the periods 1999 to 2001 and 2005 to 2007 had been low compared to the rest of the years, stating that the changes in bank input prices are not sufficient to explain the changes in bank revenue during the said periods. This indicates that changing input prices had minimal effect on bank revenue undermining competition during these two periods. Second, striking feature is that neither the size of the bank nor the credit risk are responsible for the changes in the degree of bank competition in the country during the sample period except in 2005-2007 period. The larger banks tend to earn more interest revenue restraining competition during the years 2005 to 2007. However, this effect is very small in statistical terms and explained only 8% of change in interest revenue. None of the other control variables included in the model, shows any kind of relation to bank revenue changes over time and thus to the competition of the banking sector. These findings suggest that the competitive condition in the banking sector is affected by some factors other than the elasticity of bank input prices. Thirdly, from among different stages of H statistics, price of loanable funds contribute significantly explaining degree of competition during sample

horizon. Price of labour is the second most important factor while the contribution of price of capital is least significant.

5.2. Level of banking sector stability in Sri Lanka

Banking sector stability was measured with Z-score. The calculated Z-score for the sample horizon was averaged at 17.65 with a standard deviation of 14.49. The lower level of Z-score indicates a higher risk profile for the whole banking sector and thus lower bank stability. As evident with the summary statistics, low level of profitability and its high fluctuations together with low capitalization levels may have resulted in lower level of stability in the Sri Lankan banking sector. This calculated Z-score for the Sri Lankan banking sector is comparatively lower than that of most of the developed countries. For example, according to a study done by Berger et al, (2008) the mean Z-score had been 56.76 for a sample of developed countries, of which the sample covers 23 developed countries for the period 1999-2005.

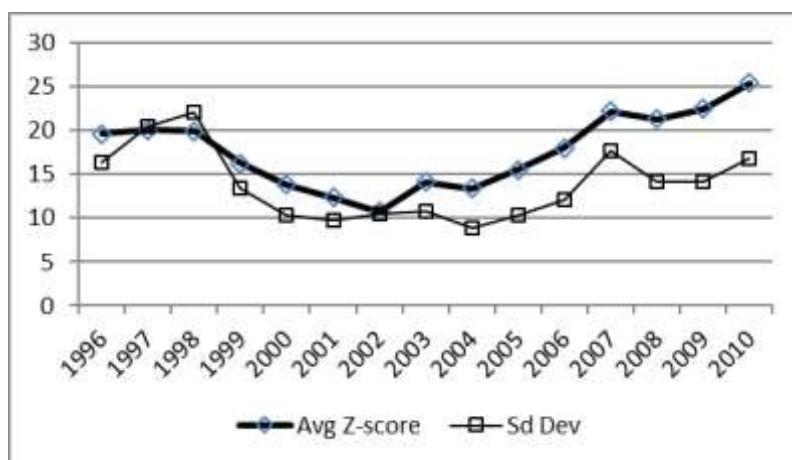


Figure 2: Annual Z-scores of the banking sector Sri Lanka-1996-2010

Source: *Author*

The Z-scores are calculated for each bank and then the bank averages are taken for each year. The results are produced with the aid of line graph and given

in figure 2. The standard deviations of the yearly Z-scores are also depicted in the graph.

Z-score of the Sri Lankan banking sector shows a comparatively higher level from 1996 to 1998 period and during this period it had a stable trend. The standard deviation of Z scores however had been increasing during this period, indicating high deviation among banks. The Z-score starts to decline sharply after 1998, until it reaches the lowest score in 2002. Accordingly, the stability of the Sri Lankan banking sector had been very low during this period. This trend in decline in stability again starts to increase after 2002 until the year 2010. As the figure shows the standard deviation of stability also shows a similar trend to a greater extent but with a less steep than average stability. A relatively steep increasing pattern of Z score (together with less steep standard deviations) indicates a trend towards higher bank stability after 2002.

5.3. Effect of competition on stability of Sri Lankan banking sector

The primary objective of the present section is to see whether the changes in bank stability are attributed by the degree of competition in the banking sector. Since the lag values of the independent variables are not taken, the short-run effects are analyzed in this equation. In order to analyze short-run effect of competition on stability the equation 1a is regressed as a fixed effect multiple regression. The bank specific fixed effect is set to capture any unobservable effects that cause bank stability. First, the possible multicollinearity is addressed and hence, all the variables except TAg_{it} were included in the model as their VIF values (see Table 2) are closer to one (except GDP).

Table 2: VIF values of independent variables

Variable	VIF value
MS	1.05
Eff	1.19
LoanRatio	1.06
CrGr	1.04
CrPvt	1.64
RGDP	2.01
RInt	1.60
Average VIF	1.37

Source: *Author*

Due to its high power in explaining bank stability RGDP was also included in the model as the average of VIF values is around one. Then the regression model was run as a fixed effect Ordinary Least Squares method. There is a significant degree of persistence in the stability variable, since the average value of the first-order autocorrelation is 0.65. Hence, the lagged dependent variable was included as an explanatory variable. The regression results of the estimation is given in Table 3.

Table 3: Regression Results of the Stability Model-initial estimation

Variable	Coefficient	t-Statistic	Prob.
C	0.153996	1.141983	0.2545
H	-1.931288	-3.258169	0.0013
H ²	2.351256	3.562452	0.0004
MS	-0.261900	-1.079538	0.2813
EFF	0.022444	1.089126	0.2771
LOANRATIO	0.031154	1.205847	0.2290
CRGR	-0.000914	-1.524927	0.1285
CRPVT	0.251615	2.757099	0.0062
GDP	0.869157	3.466583	0.0006
RINT	0.001698	1.784190	0.0755
STAB(-1)	0.777423	6.411631	0.0000
R-squared	0.815034		
Adjusted R-squared	0.793935		
F-statistic	38.62938		
Prob(F-statistic)	0.000000		
Durbin-Watson stat	1.976		

Both competition variables (H & H2) were found as strong and statistically significant. In addition, only the variable RGDP shows positive and significant relationship to the stability of the banking sector, indicating the importance of macro economic development and stability. None of the bank specific variables were found as significant in explaining stability in Sri Lankan banking sector. Applying general to specific approach resulted in a final model that best explains the stability of the banking sector. The variables, their coefficients and t statistics together with adjusted R squared and DW stat are given in Table 4.

Table 4: Regression results of stability model-Equation 1a

Variable	Coefficient
Constant	0.36*** (3.06)
H	-1.74*** (-3.38)
H2	2.00*** (3.46)
Inflection point	0.42
RGDP	0.967*** (3.65)
Stab(t-1)	0.793*** (6.64)
Adjusted R2	0.79
D-W stat	1.89

Source: *Author*

Note: The dependent variable is bank stability measured with Z score. H = the competition measure, H2 = the square value of competition measure, and RGDP is the inflation adjusted annual growth rate of gross domestic production. Stab(t-1)=lag dependent variable. t values for coefficient are in parentheses. ***, **, and * indicate a significant difference from zero at 1%, 5%, and 10%, respectively.

Both H and H2 are strong and significant in explaining the stability of Sri Lankan banking sector. H negatively correlates with stability whereas H2 positively correlates. This provides sufficient evidence for a U shape relationship between competition and stability in the Sri Lankan banking sector. Accordingly, stability falls with competition up to a certain point and starts to rise thereafter. The point where this relationship inflects is found as 0.42. This says that stability of the banking sector keeps on falling until the degree of competition (h statistic) reaches 0.43, and rising until its maximum with the increased competition. The results of the analysis thus suggest higher degree of competition for higher bank stability.

The findings of the analysis support ‘competition fragility’ view at the initial stages of bank competition. Because, when the monopoly power is exercised in the banking sector, banks limit their risk-taking in order to protect

the quasi-monopoly rents granted by their government charters. However when other banks gradually come to compete in the market with various strategies, the banks with more market power lose their market shares. Accordingly more bank competition erodes market power, decreases profit margins, and results in reduced franchise value of all the banks.

As a result the banks are encouraged to take on more risk to increase returns. This encouragement of banks to increase their overall risk exposure creates financial instability in the bank market. Thus, the results of the Sri Lankan banking sector lend supports for franchise value paradigm at the initial stages of bank competition. One other reason could be brought to explain this negative trade-off between competition and financial stability in a less competitive environment. That is, at the initial stages of competition, the activities of banks, their lending behavior become more complex and supervision and monitoring may become a little difficult. In addition, according to Allen and Gale (2004), when the competition among banks increases, bank has a minimum incentive to properly screen their borrowers, as the bank earns only fewer informational rent from the relationship with their borrowers. This again increases the risk of fragility. Another channel which affects the fragility in a competitive banking environment is inter-bank market and payment system. Banks in a highly competitive banking industry are price takers. Therefore there is no incentive to provide liquidity to a bank troubled with a temporary liquidity problem (Allen and Gale, 2000). This will then cause the failure of the troubled bank, ultimately affecting the system as a whole.

When an industry falls to competition, the failures coming through competition suggest some corrective actions. The findings of the study too confirm this common wisdom. The deteriorating bank stability slowly starts improving with further increased competition. This supports 'competition

stability' view, which predicts high competitive markets are more stable. As the found inflection point is 0.43 and majority of H statistics lie above this point, competition stability is more confirmed in the findings of the present study.

In a high competitive environment banks are price takers, so they have to squeeze down their interest rates in order to protect their market share. The lower interest rates formed in the higher competition encourage safer loan customers for borrowing and other borrowers are induced to choose less risky projects and hence are likely to face a lower probability of default. The volume of nonperforming loans would then decrease, improve financial stability. The probability of risk shifting to the bank by the borrower is limited when the banks are more mature with competition. On the other hand, when the banking systems (such as in Sri Lanka) which are comprised of a few large bank firms, the policy makers have to concentrate more on the failure in the financial system. Therefore, government has "too-important to fall" policies to safe guard the potential negative effects. These measures were especially obvious after the bank crises such as Pramuka bank and Seylan bank. Closer supervision on excessive risk taking, capital requirements regulations and other financial infrastructures are also strengthened with the increased competition. These factors could have affected the positive link between competition and stability of the Sri Lankan banking sector.

The findings of the study support the U shape relationship between bank competition and stability predicted by Martinez-Miera and Repullo (MMR 2007). As they identify, in a lower competition environment a risk-shifting effect accounting for more defaults when interest rates increase. However the present study's explanation for higher competition is quite different from that of MMR. According to them, there is a margin effect that generates more revenue for the bank coming from those non defaulted borrowers that pay a higher interest rate.

The present study argues that the positive effect in higher competitive environment stemmed as an effect of franchise value paradigm. The reasons for such argument are twofold. First, when all the banks are equally competitive no bank would take excessive risk in granting loans, but making all necessary precautions as their fear of decreased franchise value (as the franchise value itself is a competitive advantage). The decreased franchise value in turn acts as a signaling effect that would badly affect banks' deposit market. Second, competition is further promoted with necessary regulations and supervisions which have developed after the experienced fragility in the banking sector at early stages of competition.

Long run effect of bank competition on bank stability

Having analyzed the short-run effect, the long run effect of bank competition on financial stability of the banking sector is analyzed in this section. For this the Z-score; study's measure of bank stability is regressed on lags of its own and bank H statistics; study's measure of bank competition. The Equation 1b below was estimated to find this long run relationship between competition and stability (the Equation 1b was developed by excluding the control variables of the Equation 1a).

$$Stab_{it} = \alpha_{it} + \beta_1 H_{t-1} + \beta_2 H_{t-2} + \lambda_1 Stab_{t-1} \quad \text{----- (Equation 1b)}$$

As in the case of previous models the equation 1b was estimated by using EGLS analysis with period weights. The result of the regression is given bellow.

$$Stab_{it} = 0.027 + 0.018H_{t-1} - 0.029H_{t-2} + 0.879Stab_{t-1} \quad \text{--- (Equation1b)}$$

(0.76) (0.31) (0.66) (16.62)***

The long run effect of bank competition on bank stability is found with a mix of positive and negative effects. However both coefficients are very weak

and statistically insignificant. Therefore, the analysis of this section does not provide sufficient evidence on long run effect of bank competition on bank stability.

5.4. Robustness Stability Model

The estimation procedures of the stability model were generated heteroscedasticity consistent estimates by employing White's correction in order to keep the estimators efficient. The last rows in Table 4 give more information as to how the explanatory power of study's competition-stability model have been built up. The adjusted R² says that two models used by the study generally explains around 79% of variations in financial stability in Sri Lankan banking sector. The constant values of stability model are comparatively high in the present study. These comparatively higher constants can be explained in two ways. First, the explanatory variables may not adequately predict the expected relationship. Because the error terms of the explanatory variables are comparatively higher in Sri Lankan context. Hence, the statistical significance of the model in explaining the stability levels of Sri Lankan banks may be comparatively low. If it is so, additional explanatory variables declines the constant of the models considerably. Second, the explanatory variables of the model may be sufficient, but a rather unpredictable pattern of efficiency behavior among Sri Lankan banks is evidenced by the model. Especially the frequent stagnation of measurable and non-measurable economic activities and different responses for these variations have dramatically affected in relating the outcomes of findings of this kind of studies to the actual data. The stability model tested here is free from autocorrelation as the DW stat of the model is within the decision range.

6. Conclusion

As stated at the beginning, the objective of this chapter was to examine the effect of bank competition on efficiency and stability of the banking sector in Sri Lanka. Using bank level data for the period 1996 to 2010 the chapter first estimated the degree of bank competition by using Panzer-Ross H statistics. The study then performed a test to assess the effect of bank competition on the financial stability of the banking sector. For this purpose a series of bank level data were used for the sample period.

A few observations are important to be summarized here. First, the estimated H statistics gave sufficient statistical support for a moderate level of competition in the Sri Lankan banking sector. However this had not been static and evidenced some ups and downs along the sample period. Therefore bank competition could be identified as a short term and dynamic phenomenon. The effect of competition on financial stability of the banking sector supports a U shape relationship in the short run. These results are suggestive of a degree of bank competition in the country higher than 0.42 (H statistics) in order to enhance stability in the banking sector. But empirical evidence of the current study does not provide sufficient evidence for long run effect of bank competition on banking sector stability. Thus, the study supports ‘competition stability view’ in the short run, and does not support any evidence on ‘competition fragility view’.

However, since a long term positive impact of bank competition on bank stability is not evident in the study, careful precautions for a sound banking sector can be suggested. This is to ensure long lasting positive implications of banking sector competition on the economy. For this purpose, strengthening of bank supervision and other financial infrastructure such as payment and securities settlement systems, clearing systems and trading platforms, is important. The infrastructure service providers such as credit rating agencies, credit information

registries and financial information providers also need to be further strengthened. Regulatory framework consisting of laws and rules which establish the bounds within which financial institutions, markets and systems must operate, need to be frequently updated to match the changing requirements.

This study provides new and rather scarce evidence of effects of banking sector competition on financial stability of the Sri Lankan banking sector. By applying the new empirical industrial organization approach, the study finds that Sri Lankan banking market is moderately competitive. The moderate level of bank financial stability of the banking sector is attributed to the moderate level of competition in Sri Lankan banking industry. Hence, the findings of the study revealed that the degree of bank competition prevails at present is not the optimum, as far as stability of the banking sector is concerned. Therefore the evidence suggests enhancing bank competition to attain its positive outcome at its maximum.

7. References

- Allen, F., Gale, D., (2000), Financial Contagion. *The Journal of Political Economy*, 108(1), pp. 1-33.
- Allen, F., Gale, D., (2004), Competition and financial stability. *Journal of Money, Credit and Banking* 36(3), pp. 453-480.
- Beck, T., (2008), Bank Competition and Financial Stability: Friends or Foes? Working Paper No. 4656, Policy Research Working paper series, World Bank.
- Beck, T., Demirgüç-Kunt, A., Levine, R. (2006b) Bank Concentration and Fragility: Impact and Mechanics, In: Stulz, R., and Carey, M. (eds), *The Risks of Financial Institutions*, National Bureau of Economic Research
- 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.

- Boyd, J.H., De Nicoló, G., (2005), The theory of bank risk taking and competition revisited. *Journal of Finance*, 60(1), pp. 1329-1343.
- Carletti, E., Hartmann, P., (2003), Competition and Financial Stability. What's Special about Banking? P. Mizen (eds) In *Monetary History, Exchange Rates and Financial Markets: Essays in Honor of Charles Goodhart*, Vol. 2, Cheltenham, UK,
- Central Bank of Sri Lanka, *Annual Reports*, 2005-2008, Colombo, Sri Lanka.
Central Bank of Sri Lanka, *Financial system stability Review*, 2005-2010, Colombo, Sri Lanka.
- Guzman, M., (2000), Bank Structure, Capital Accumulation, and Growth: A Simple Macroeconomic Model. *Economic Theory*, 16(2), pp. 421-455.
- Hellmann, T., Murdock, K., and Stiglitz, J., 2000, Liberalization, moral hazard in banking, and prudential regulation: Are capital requirements enough? *American Economic Review*, 90(1), pp. 147-165. Institution: Washington D.C.)
- 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.
- Keeley, M., 1990, Deposit insurance, risk and market power in banking. *American Economic Review*, 80(5), pp. 1183-1200.
- Koskela, E., Stenbacka, R., 2000, is there a tradeoff between bank Competition and financial fragility? *Journal of Banking & Finance* 24(12), pp. 1853-1873.
- Marcus, A. J., (1984) Deregulation and bank financial policy. *Journal of Banking and Finance* 8(4), pp. 557-565.
- Martínez-Miera, D., and Repullo, R., 2007, Does competition reduce the risk of bank failure? Unpublished manuscript, Centre for Monetary and Financial Studies.
- Matutes, C. and Vives, X., 1996, Competition for Deposits, Fragility and Insurance. *Journal of Financial Intermediation*, 5, pp. 184-216.

McKinnon, R., 1973, *Money and Capital in Economic Development* (The Brookings Institution: Washington D.C.)

Panzar, J., and Rosse, J., 1987, Testing for 'monopoly' equilibrium. *Journal of Industrial Economics*, 35(4), pp. 443-456.

Schaeck, K., and Cihak, M., 2008, How does competition affect efficiency and soundness in banking? Working paper no 932, European Central Bank.

Shaw, E. (1973) *Financial Deepening in Economic Development*, (New York: Oxford University Press).

Stiglitz, J., Weiss, A., 1981, Credit rationing with imperfect information. *The American Economic Review*, 71(3), pp. 393-410.