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# Assessing Banking Sector Competition in Zimbabwe Using a Panzar-Rosse Approach

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## Abstract

This paper assesses the level of competition in Zimbabwe's banking sector using the Panzar-Rosse H-statistic. The H-Statistic has been assessed, using the total revenues regression equation, and applying the panel least square regression model with fixed effects. The H-statistics is estimated at 0.56, which result is confirmed, using bank random effects and the General methods of moments, yield similar results. The H-statics obtained from the two methods are 0.54 and 0.51 for the random effect and generalised methods of moments, respectively. The results confirm the presence of a monopolistic competition. On an annual basis, the results show that the Zimbabwean banking sector is evolving towards perfect competition. The increased competition was evident through aggressive promotions, increased marketing of banking products, and increased tenure of loans from one year to three years for individuals as banks tried to outclass each other. The study recommends that the government should desist from tampering with market forces as this reduces the amount of competition.

## 1 Introduction

A competitive banking system is a pre-requisite for effective intermediation between savers and investors. A banking sector that is able to bring about superior innovation, decreased prices and enhanced quality of the goods and services produced, thus improving the standard of living through increasing choices and welfare of the citizens (Carbo et al. 2009). Competition is also important for effective monetary policy transmission, increasing the speed at which policy interest rates, set by the central bank, transfer through to the banking sector. Competition impacts financial innovation, financial wealth of banks, financial stability and the extent to which small to medium enterprises have access to affordable financing (Bikker 2010).

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There are a number of arguments in favour of banking competition. Banking competition helps to foster higher economic growth (Buchs & Mathiesen 2005). It enhances efficiency as it compels managers to cut down on costs in order to remain profitable (Claessens & Laeven 2004). Banking competition improves the corporate sector's access to finance, reducing the chances of financial crises (Claessens & Klingebiel 2001). Banking competition facilitates banks to satisfy the needs of the public at a reduced social cost and enhances the efficiency of the production and quality of financial services and products. Claessens and Laeven (2004) argued that a reduction in the level of competition in the banking sector will make provision of financial services costly leading to less financing which impedes economic growth.

Given the arguments in favour of competition in the banking sector, this paper attempts to measure the level of competition in the Zimbabwean banking system after the introduction of dollarization in 2009. The motive for investigating the Zimbabwean banking sector arises from the economic crisis that affected the economy during the period 2000-2008. The economy suffered one of the worst hyperinflation episodes in the world. The hyperinflation environment reduced profitability of the banking institutions in real terms. Bank balance sheets were severely affected by the hyperinflation; they shrank in real terms because of the losses on an inflation adjusted basis attributed to the highly negative real returns on government securities and high levels of statutory reserves (Chipika & Malaba 2011). Savings by the banking public in banks were eroded as inflation continued to rise. The erosion of the bank balances by inflation led to the loss of confidence in banks by the banking public. The situation was exacerbated by the imposition of withdrawal limits by the Central Bank. The continued upwards spiralling inflation depleted the withdrawal limits which further lessened the public's confidence in the banking sector.

The profundity of the financial intermediation in the economy declined. Inefficiencies in the national payment systems, the slowdown in the local currency denomination, loans and declining foreign currency flows into the formal banking sector, led to a significant decline in traditional bank lending. Balance sheets contracted significantly despite the efforts by banks to hedge against inflation through investments in real assets. The problem was arrested through dollarization of the economy when Zimbabwe adopted a basket of currencies (multi-currency system) as legal tender in February 2009.

The introduction of the multi-currency system after the prolonged economic decline of almost one decade (2000-2008) led to the end of hyperinflation. Under the multi-currency system, the economy registered price stability with inflation averaging two per cent before further declining into negative rates in 2014 (ZimStats 2015). Low inflation is supported by studies of dollarized economies where inflation was found to be lower compared to those non-dollarized countries (Alesina & Barro 2001). Inflation in dollarized economies usually mirrors that of a country whose currency is being used.

This paper is an empirical assessment of the banking sector competition between 2009 and 2014 using the Panzar and Rosse model (P-R model). The paper specifically has three objectives. Firstly, it tests for equilibrium within

the Zimbabwean banking sector over the whole period 2009-2014. Secondly, it assesses competition for the whole period under consideration. Thirdly, the objective is the estimation of the degree of competition each year; ascertaining the evolution of the competition during the study period.

Section two of this paper outlines the background of the problem. Section three reviews the literature; section four outlines the Panza and Rosse methodology of estimating competition in the banking sector. Section five presents the results of the study followed by the conclusions and recommendations in section six.

## 2 Overview of the Zimbabwean banking sector

Zimbabwe officially dollarized in February 2009 (GoZ 2009) and adopted a basket of currencies in response to the hyperinflation and continued decline in economic activity. Dollarization can be defined as a shift away from the domestic currency to a foreign currency to fulfil the main functions of money, such as storing of value, unit of account, and medium of exchange (Bogetic 2000). Dollarization is usually a response to unstable macroeconomic conditions (examples include Ecuador, Panama and El Salvador) and the citizens of the country look at alternative means to diversify their assets in the face of heightened domestic currency risks. An example of a country that also adopted dollarization is Ecuador. Ecuador, like Zimbabwe, after experiencing economic instability, dollarized their economy in 2000. Within the year of dollarization the Central Bank of Ecuador repurchased almost all the outstanding stock of Sucres and managed to convert all deposits which were held by banks into dollars (Quispe-Agnoli & Whisler 2006).

In sharp contrast to what happened in Ecuador, the Zimbabwean government did not repurchase the Zimbabwean dollars in circulation nor converted the deposits which were held by the banks. The failure by the authorities to *demonetize* the Zimbabwean dollar destroyed the confidence of the banking public that previously had seen their savings reduced by hyperinflation and the debasing of the Zimbabwean dollar.

Under the multi-currency system, the banking sector decreased from 28 shortly before dollarization to 20 banks by mid-2014 (Table 1). The decline in the number of banks resulted from the collapse of some of the banks and the consolidations and mergers that took place in an effort to meet the stringent regulatory capital requirements. The Central Bank cancelled six banking licenses while one bank was placed under curatorship. The failure of the banks was mostly due to poor corporate governance, insolvency and imprudent lending activities (RBZ 2014).

The average banks' performance, measured by the return on assets and return on equity, increased at first and then declined over the period. The profitability was on the increase for the period 2009-2011, after which, it took a downward turn in 2012 and continued thus during 2013. The banking sector profit margins therefore have been jeopardised in the multi-currency environ-

ment despite higher interest rate margins, as reflected by the low profitability ratios compared to periods prior to the multi-currency system.

The market share of the top four banks, as shown in Table 2 below, declined during the multi-currency period. This was mainly a result of the confidence boosting measures which the Central Bank put in place. These measures included increasing capital requirements and introducing stringent risk management guidelines. Prior to multi-currency the banking sector experienced a flight to quality situation where the banking public moved their deposits to established international banks. With increased competition, product offering, especially loans, more clients were attracted. The flight to quality experiences is reflected by the high market shares of the top four banks which reached 97 per cent at the height of the hyperinflation in 2008.

Table 2 shows that the number of NPLs has increased during the multi-currency system. The increase in the amount of NPLs was a result of lending to risky borrowers against the background of increasing competition in the sector. On the other hand banks were also experiencing an increase in insider loans; a sign of deterioration in good corporate governance.

The interest rate margin, which is a proxy for efficiency, shows an improvement and, over time, interest margins account for a growing share of gross income from 12 per cent in 2004 to 35 per cent in 2012. The wide ranging interest spreads among banking institutions reflect the different costs and lending rates charged by banks. International banks have very low costs of funds accounting for the relative ease of their mobilising deposits, which can be ascribed to their low risk profiles and access to lines of credit. In contrast, small banks suffered high weighted costs of funds; a symptom of the high costs they faced in mobilising funds. Table 2 also shows that despite the relatively low costs of funds for some banks, the maximum lending rates continued to be punitively high and proving to be an impediment to economic recovery. Zimbabwean banks have also been proactive in adopting and internalising international best practices and new technologies as reflected by the progress made by implementing the Basel 2 and 3 Capital Accords.

The government instituted a Memorandum of Understanding (MoU) between the Central Bank and the other Banks in February 2013 regarding bank charges and interest rates in the banking sector. Effectively the sector became a controlled one. This was upon the realisation by the Zimbabwean Government that Banks were charging exorbitant interest rates and bank charges to their clients. The MoU altered the business conditions, the interest rate on deposit and investment accounts, and on overdrafts, loans and advances. This restricted the amount of competition as these revenue streams became predefined by the authorities and consequently banks could not compete on this front. All banking institutions, for example, were supposed to pay interest on savings accounts; however, each participating banking institution was at liberty to create its own variety of savings accounts. The MoU required that lending rates be set at a rate not exceeding 12.5 percentage points above the participating financial institutions weighted cost of funds. Any term deposit by individual customers of US\$1 000 was supposed to attract an interest rate of no less than 4 per cent

when held over a period of at least 30 days. The MoU exempted the elderly (above sixty years) from all forms of bank charges including account maintenance fees except where such accounts were used for business purposes. The effect of the controls was to make the banking conditions almost the same for all the banks.

The Market concentration measured by the Herfindahl-Hirschman Index (HHI) shows that the banking deposits were increasing in concentration.

Figure 1 indicates that the index value increased from 1,300 in 2009 to 1,420 as at 31 December 2014 (Figure 3). The graph shows that competition in the banking sector increased between 2010 and 2012 as evidenced by a lower HHI compared to that of 2009. The period was characterised by a declining concentration index. The concentration index was higher than the 2009 level in 2013 and 2014, showing that compared to 2009, there was less competition in the banking sector during that period.

### 3 Literature review

Claessens (2009) identified three approaches to empirical measurement of competition: market structure and associated indicators; contestability and regulatory indicators to gauge contestability; and formal competition measures. The Structure-Conduct-Performance (SCP) paradigm links structure and performance. The market structure is mostly defined by the level of concentration in the market. Conduct relates to the behaviour of the firms in terms of competitiveness or ability to collude. Behaviour takes various forms including pricing, research and development, barriers to entry and technology choice, among others. Performance is mostly defined by market power - market power implying lower efficiency. The SCP argument is that the structure of the industry influences its conduct, which in turn affects performance. For example, if there is low concentration in the industry it will lead to increased competition. Increased competition will lead to reduced market power among the players and improve efficiency. Lower concentration is therefore associated with lower market power. The SCP paradigm is derived from the neo-classical analysis of markets. The initial studies were expanded by including proxy variables for efficiency with the aim of testing the so-called efficient structure hypothesis (Berger 1995). The approach is based on factors such as financial system concentration, the number of banks, or Herfindahl indices.

The contestability and regulatory indicators approach relies on regulatory indicators to gauge the degree of contestability. This method considers regulatory issues such as entry requirements, formal and informal barriers to entry for domestic and foreign banks and activity restrictions, among others. The method further takes into account changes over time in financial instruments and innovations, given that these can alter the competition environment. There has been an expansion in the competition determinants with the inclusion of regulatory and institutional variables. Demirgüç-Kunt et al. (2004) investigated the impact of bank-specific characteristics, bank regulations, market structure,

and institutional development on bank performance. Barth et al. (2004) examined the relationships between a number of bank regulations and supervisory practices as well as aggregate measures of bank development, performance and stability using a cross-country database.

The formal approach to measuring competition substitutes the reaction of output to input prices. Most of these formal competition measures have been applied in other industries and adopted in measuring banking sector competition. These methods are underpinned by a number of assumptions on cost and production functions. These methods have been developed to circumvent the weaknesses of the SCP. The weakness of the SCP and the efficiency hypotheses is that they assume one way causalities from market structure to performance. This means that SCP fails to account for the conduct of the banks in the market and the impact of performance of the banks on market structure. The New Empirical Industrial Organisation (NEIO) tried to avoid inferring competition from market shares or market structure but directly inferred firms' conduct using a number of methodologies. This approach uses optimisation models, from which, indicators of competition such as the Lerner index, the Panzar and Rosse test ("H-statistic"), conjectural variation and the Boone indicator are derived.

The Panzar and Rosse (1982, 1987) H-statistic measures industry competition based on the elasticity of bank interest revenues to input prices. This approach analyses the transmission of changes in input prices to bank revenue. This approach was applied by Bikker and Haaf (2002), Gelos and Roldos (2002), Claessens and Laeven (2004), and Levy-Yeyati and Micco (2007). This method falls is classified as non-structural methods that assess competition in respect of new empirical industrial organisations derived from the equilibrium conditions. One of the assumptions underlying the P-R test is that the test only applies for single-output firms. In applying this model to the banking sector, banks are treated as producers of intermediation services by means of factor inputs such as labour, physical and financial capital. The other underlying assumption of the P-R approach relates to the cost structure, which must be homogeneous, and the price elasticity of demand, which must be greater than one.

The derivation of the Panzar and Rosse H-statistic in this section is based upon the work of Bikker and Haaf (2002). Consider a representative bank  $i$ ; the profit maximisation condition holds for both the industry and firm level. At the firm level the profit maximisation condition is given as follows:

$$R_i(y_i^*, Z_i^R) = C_i(y_i^*, W_i, Z_i^C) \quad (1)$$

Where  $R_i(y_i^*, Z_i^R)$  and  $C_i(y_i^*, W_i, Z_i^C)$  are the revenue and cost functions of bank  $i$ .  $y_i$  is the output of the firm,  $W_i$  is a  $K$ -dimensional vector of factor input prices of bank  $i$ ,  $W_i = (w_1, w_2, \dots, w_K)$ ,  $Z_i^R$  is a vector of  $j$  exogenous variables affecting the revenue function  $Z_i^R = (z_{1i}^R, z_{2i}^R, \dots, z_{L_i}^R)$ ,  $Z_i^C$  is a vector of  $L$  exogenous variables that shift the cost function  $Z_i^C = (z_{1i}^C, z_{2i}^C, \dots, z_{L_i}^C)$ .

At the individual level, the marginal revenue must equal marginal cost:

$$R'_i(y_i^*, Z_i^R) = C'_i(y_i^*, W_i, Z_i^C) \quad (2)$$

The H-statistic evaluates the elasticity of total revenues with respect to changes in factor input prices:

$$H = \sum_{k=1}^K \frac{\partial R_i^*}{\partial w_{ki}} \cdot \frac{w_{ki}}{R_i^*} \quad (3)$$

The P-R approach usually assumes log linearity in the specifications of the marginal revenue and marginal cost functions.

$$\text{Ln}(R_i') = a_0 + a_1 \text{Ln}(y_i) + \sum_{j=1}^J d_j \text{Ln}(Z_{ji}^R) \quad (4)$$

$$\text{Ln}(C_t') = c_0 + c_1 \text{Ln}(y_i) + \sum_{k=1}^J b_k \text{Ln}(w_{ki}) + \sum_{j=1}^J v_j \text{Ln}(Z_{li}^C) \quad (5)$$

For a profit maximising bank the equilibrium output results from (2):

$$a_0 + a_1 \text{Ln}(y_i) + \sum_{j=1}^J d_j \text{Ln}(Z_{ji}^R) = c_0 + c_1 \text{Ln}(y_i) + \sum_{k=1}^J b_k \text{Ln}(w_{ki}) + \sum_{j=1}^J v_j \text{Ln}(Z_{li}^C) \quad (6)$$

Rearranging terms:

$$\text{Ln}(y_i) = \frac{i}{(a_1 - c_1)} \cdot \left[ c_0 - a_0 + \sum_{k=1}^J b_k \text{Ln}(w_{ki}) + \sum_{j=1}^J v_j \text{Ln}(Z_{li}^C) - \sum_{j=1}^J d_j \text{Ln}(Z_{ji}^R) \right] \quad (7)$$

The reduced form equation for revenues of the representative bank is given by the product of the equilibrium output of bank  $i$  and the common price level:

$$\text{Ln}(R_i^*) = \text{Ln}(P^* y_i^*) \quad (8)$$

The price level is provided by the inverse demand equation, which also reads in logarithms:

$$\text{Ln}(p) = \mu + \lambda \text{Ln}(Y) \quad (9)$$

$$\text{where} \quad Y = \sum_{i=1}^I y_i \quad (10)$$

$Y$  is the aggregate output of the industry. The reduced form revenue equation after algebraic manipulation is achieved by:

$$\text{Ln}(R_t^*) = \alpha + \sum_{k=1}^K \beta_k \text{Ln}(w_{ki}) + \sum_{q=1}^Q \delta_q \text{Ln}(z_{qi}) \quad (11)$$

Where  $z_i$  is a vector of  $Q$  bank specific variables, without reference to their origin from the cost or revenue function  $z_i = (z_{1i}, \dots, z_{Qi})$ .



There are a number of studies that have applied the Panzar-Rosse methodology in measuring the degree of competition in the banking sector. These include Gelos and Roldos (2002); Nathan and Neave (1989); Claessens and Laeven (2004); De Bandt and Davis (2000); and Aktan and Massood (2010). Bikker and Groeneveld (2000) used data from a sample of European countries between 1989 and 1996 and found that there was no competition during the study period. Haffani (2002) studied the structure of Tunisia's banking sector during the period 1980 to 1999 applying the Panzar-Rosse method. The results showed that the Tunisian banking sector operated under monopolistic conditions with increasing competition. Bikker and Haaf (2002) analysed 23 OECD countries over the period 1988 to 1998 and their results showed that the countries were operating in a market structure of monopolistic competition. They further found that competition seemed to be stronger for large banks and weaker for smaller banks.

Weill (2004) studied twelve European countries during the period 1994 to 1999 using the yearly Tobit-based estimates of the H-statistic. The results showed that the countries, e.g. Spain, were operating under a decreasing pattern of monopolistic competition. He further found that there was a negative relationship between competition and efficiency. Al-Muharrami et al. (2006) studied the Arab Gulf Cooperation Council's banking sector over the period 1993 to 2002. Using the pooled and the fixed effect method found that the H-statistics was 0.24 and 0.47 respectively. The results meant that the banking sector was operating in a monopolistic competition environment. Wong et al. (2006) studied the evolution of competition in the banking sector of Hong Kong during the period 1991 to 2005 using the Panzar-Rosse method. The results showed that competitive pressure was higher among larger banks and lower among smaller banks.

Roldos and Gelos (2004) studied the structure of the banking sector in a number of European and Latin American countries and found that there was significant bank consolidation which led to a decline in the number of banks. The reduction in the number of banks did not reflect an increase in consolidation of the banking sector as measured by the standard concentration ratios, thus competition did not increase. The decline in the competitive pressures was as a result of lowering barriers to entry through increased participation of foreign banks. Casu and Giradone (2006) found that the degree of concentration and the level of competition were independent of each other. Ariss (2009) established that the market structure in the banking system in the MENA region exhibited a monopolistic competition structure despite the increase in concentration. Claessens and Laeven (2004) found that the banking sector, which allowed foreign banks to enter their market and that those that did not restrict entry and activities were more competitive. The results did not find any evidence supporting negative relationships between banking system concentration competition and. These results supported the contestability hypothesis as contestability was found to affect competition. Abdul-Majid and Sofian (2008) studied the level of competition and the structure of the Islamic banking industry in Malaysia and found that the Malaysian banking sector was neither a

monopoly market or perfectly competitive. The results pointed that the Islamic banks in Malaysia operated under monopolistic competition.

Korsah, Nyarko and Tagoe (2001) measured the intensity of bank competition in the Ghanaian banking sector after the implementation of economic reforms. The results showed that there was an increase in competition in Ghana's banking system as a result of the economic reforms and the banking sector was oligopolistic in nature, which explained the profitability of the sector. Fu and Heffernan (2009) investigated the relationship between market structure and performance in the Chinese banking system after the reforms in the financial sector. They found that x-efficiency significantly decreased and the majority of the banks operated below the levels of efficiencies of effective scale.

Delis (2012) argued that financial reforms and the quality of institutions are major determinants that promote competitive conduct of banks. The argument implies that the competitiveness of the banking sector increases with financial sector reforms in countries with stronger institutions which bring about financial innovation. Moyo and Nandwa (2014) argued that reforms are supposed to increase the amount of competition leading to financial innovation and efficiency. This argument is supported by Hauner and Peiris (2005) argued that a high degree of competition and efficiency leads to financial stability, product innovation, and access by households and firms to financial services. Yildirim and Philippatos (2007) also supported this view and proved that an increase in competition can enhance the prospects for economic growth, by raising the availability of credit and financial services to businesses and households. Moyo and Nandwa (2014) identified a negative side to increased competition; that it could be a source of systemic risk to the financial structure through contagion leading to macroeconomic instability and reduced investments and growth. Hauner and Peiris (2005) argued that the recent global financial crisis is a testimony to the effect of financial sector reforms that mostly originated from excessive risk taking behaviour by banks. Noland (1996) studied the liberalisation of the domestic financial markets and found that financial liberalisation led to the convergence of the borrowing rates between the formal and informal markets. The creation of this competitive environment led to the banks to adopt cost cutting measures, efficiently use resources, reduce labour costs and increase the quality of services such as faster clearing of payments, rapid loan application processing and extended banking hours for the benefit of their clients. Cooray (2003) compared the pre- and post-reform periods in Sri Lanka in terms of regulatory reforms. Cooray measured the number of financial instruments on the market, depth by the volume of deposits, and resilience by the ability to bounce back from a price change. In addition Cooray (2003) found that though the reforms were still being implemented there was improvement in the width and depth of the financial system.

There was also improvement in terms of competition. The operational and allocative efficiency was found to have increased while the financial sector became resilient. Bhetuwal (2005) examined the financial liberalisation in Nepal in terms of entry barriers, interest rate controls, credit controls, regulations and financial transactions, and privatisation of the financial sector each classified

into fully repressed, partially repressed, largely liberalised and fully liberalised. The results revealed a two way causality, running from financial liberalisation leading to financial development and vice versa. Bhetuwal (2005) further found that the reforms did not have an effect on mobilisation of financial saving, interest rate and currency stabilisation. Poshakwale and Qian (2009) studied the effects of financial sector reforms on the competitiveness of the Egyptian financial sector competitiveness and production efficiency. Their findings indicated that there was significant improvement in the competitiveness and production efficiency after the reforms. However they did not find any long run relationship between increased efficiency and economic growth.

Koskela and Stenbecka (2000) found that an increase in competition leads to a decline in lending rates which increased investments. The results also showed that under mean-shifting investment technologies, higher investments do not increase the bankruptcy risks of borrowers concluding that competition-fragility hypothesis is inconclusive. Matutes and Vives (2000) studied the effect of competition for deposits on the risk-taking behaviour of banks. They found that the uninsured market generates excessive deposit rates under perfect competition. This means there is a high asset risk. Flat-rate deposit insurance schemes and perfectly competitive banks also yield excessive deposit rates even if there is no failure costs, and therefore high asset risk. The results favoured the competition fragility hypothesis. Jimenez et al. (2007) investigated the competitiveness of the Spanish banking system and concluded that greater banking competition was associated with an increase in non-performing loans, which means that competition brings about risk behaviour on the part of the banks. This supported the competition fragility hypothesis. Berger et al. (2008) found that the risk exposure of banks was driven by higher market power. Increased market power increased loan portfolio risks, which support the competition-stability. The results confirmed the existence of competition-stability and competition fragility hypothesis. Liu et al. (2010) studied the degree of competition in European countries during the period 2000 to 2008. Their study sought to establish the existence of the competition-stability relationship. The study employed the Lerner index as a measure of competition and the Z-index as a proxy of bank stability. A nonlinear relationship was established between competition and stability. A negative relationship was established between competition and net interest margins (proxy for profit) meaning that an increase in banking competition had the effect of decreasing the net interest margins and increasing bank stability. This supported the competition stability hypothesis. Chirwa (2003) studied the connection between market structure and profitability of commercial banks in Malawi. The level of competition was found to have increased as a result of an increase in the number of commercial banks and financial institutions in general. A long run relationship was established between concentration of the banking sector and the level of profitability. The study established that collusion hypothesis hold for the Malawian financial sector as commercial bank profitability was positively related with measures of concentration. Hakam, Fatine and Zakaria (2012) studied the determinants of competition in Morocco. Macroeconomic aggregates were found to be the main determinants of competition in Morocco.

Competition and concentration had a positive relationship while profitability and economic growth were negatively correlated. This showed that sustained economic growth enabled banks to maintain a competitive edge through retaining their share of the markets sustaining high levels of concentration. The positive relationship between competition and interbank interest rates meant that monetary policies positively impacted on the level of competition.

Competition is not supposed to be a sudden process given that it can potentially cause bank insolvency which can affect financial stability (Bikker & Boss 2005). Banks that operate in non-competitive markets suffer from intermediate monitoring costs and are likely to generate risky loans setting the stage for subsequent problems in the system such as rising non-performing loans (Caminal & Matures 2002). Another perspective on banking sector competition is that a lack of competition leads to limited access to finance by the key productive sectors of the economy, which then limits established corporates from financing investment through the banking system. A banking system that lacks competition leads to financial exclusion since higher banking competition with access to a wide range of product offering at a lower price improves financial inclusion. Bikker (2010) contended that competition should be allowed to a certain extent, beyond which, it becomes counterproductive. Bikker (2010) further argued that competition to a certain level leads to reduced excess profits and banks become constrained in their efforts to build extra buffers to protect them from shocks.

Mlambo and Ncube (2011) studied the South African banking sector to ascertain its degree of competition and efficiency. Using the Panza and Rosse approach, they found that the South African banking sector was operating under monopolistic competition. They further found that the banking sector in South Africa was dominated by five banks which accounted for over 85 per cent of total banking assets. Using a unique and detailed bank-level data set for Zambia, Simpasa (2013) estimated the H-statistic for the Zambian banking sector. The study found the H-statistic to be positive and statistically different from zero and unit. Simpasa (2013) estimated the H-Statistic for Zambia at 0.46 implying that Zambian banks earned their revenue under conditions of monopolistic competition. The study also found that all three input prices were positive and significant.

## 4 Methodology

This section outlines the methodology and data used in this paper. The model is specified and based on the works by Claessen and Laeven (2004). The model used comprises the prices of the factors of production and bank specific variables. The regression equation to be estimated is outlined in equation 12:

$$\ln(R_{it}) = \alpha_i + \beta_1 \ln(W_{1,it}) + \beta_2 \ln(W_{2,it}) + \beta_3 \ln(W_{3,it}) + \gamma(Z_{it}) + \varepsilon_{it} \quad (12)$$

Where  $i$  denotes banks and  $t$  denotes years.  $R_{it}$  is the ratio of gross revenues to total assets,  $W_1$  is the ratio of interest expenses to total deposits and money market funding (proxy for input price of deposits),  $W_2$  is the ratio of personnel

expenses to total assets (proxy for input price of labour) and  $W_3$  is the ratio of other operating and administrative expenses to total assets (proxy for input price of equipment/fixed capital).  $Z$  is a matrix of controls including the ratio of equity to total assets, the ratio of net loans to total assets, and the logarithm of assets (to control for bank size effects). LETA is the ratio of equity to total assets, LLTA the ratio of net loans to total assets, and the logarithm of assets to control for bank size effects is denoted by LASS. All the variables are in natural logarithm. The control variables basically capture the set of bank-specific factors. These factors are intended to capture the difference capital base (LETA), business mix and size. These control variables specifically account for liquidity risk, variations in the credit risk (LLTA) and the importance of bank size, captured by the size of asset base (LASS). Finally,  $\varepsilon_{it}$  denotes bank-level fixed effects.

The H-statistic is then defined as follows:

$$H = \beta_1 + \beta_2 + \beta_3 \quad (13)$$

The interpretation of the H-statistic is shown in Table 3 below.

The underlying assumptions of the P-R approach are that it should be used where the observations are in long-run equilibrium. The long-run equilibrium can be tested by using the H-statistic in a reduced form equation of profitability. Two measures that can be used for profitability are the return on assets or return on equity in place of the revenue as the dependent variable. The resultant H is supposed to be significantly equal to zero in equilibrium and significantly negative in the case of disequilibrium. The risk adjusted rates of return in a competitive market will equalise across firms such that rates of return should not be correlated statistically with factor input prices.

To verify the condition of long-run equilibrium, the following regression is estimated:

$$\ln(ROA_{it}) = \alpha_i + \beta_1 \ln(W_{1,it}) + \beta_2 \ln(W_{2,it}) + \beta_3 \ln(W_{3,it}) + \gamma(Z_{it}) + \varepsilon_{it} \quad (14)$$

ROA is the pre-tax return on assets. Because ROA can take on negative values, the dependent variable is computed as  $\ln(1+ROA)$ . The equilibrium E-statistic is defined as follows:

$$E = \beta_1 + \beta_2 + \beta_3 \quad (15)$$

The test of long-run equilibrium involves testing whether  $E=0$ . If  $E<0$ , there is long-run disequilibrium while if  $E=0$ , there is long-run equilibrium. The test for the longrun equilibrium is undertaken using the Wald coefficient restriction test which tests whether  $E=0$  or not.

A panel data approach is employed to estimate regression equations. The approach is better able to identify and measure effects that are simply not detectable in pure cross-section or pure time series. Panel data allow the construction and testing of more complicated behavioural models than purely cross-sectional or time-series data. A number of approaches are used in panel data

analyses. These include the pooled ordinary least squares (POLS), fixed effects (FE) and random effects (RE) techniques. The POLS approach is simply an ordinary least squares approach. This approach does not consider the differences among individuals across time periods and thus it does not consider the panel nature of the dataset. In addition the estimates obtained by adopting this measure are heavily biased because of the heterogeneity between the error term and the independent variables. It is because of the inadequacy of the POLS to capture the panel nature of the dataset that the fixed effects and the random effects models become useful. To decide between fixed or random effects a Hausman test can be run where the null hypothesis states that *the preferred model is random effects against the alternative, the fixed effects*. It basically tests whether the unique errors ( $U_i$ ) are correlated with the regressors, the null hypothesis is they are not. For the robustness check, the results from fixed effects are compared with the results obtained using the GMM method. The GMM method addresses the potential endogeneity bias in panel data by employing the instrumental variables.

The data used for this study comprise a strongly balanced panel data set collected from the bank reports, websites of the banks, Reserve Bank reports and other sources. There are 18 banks that are included in the sample and quarterly data is used. The banks included in the sample are those that operated throughout the whole period of the study. The time period chosen for consideration is 2009 Q1 to 2014 Q2. The time period considered is the multi-currency period when Zimbabwe was using a basket of currencies and the country does not have its own currency. This time period is important because the country was transitioning from a hyperinflation period to a period of relative stability.

## 5 Results presentation and analysis

Table 4 presents the descriptive statistics of the variables under consideration. It shows the average values of the variables, the maximum, minimum and the standard deviation.

The data sets are a balanced panel with 378 observations taken for 18 banks over the period of 21 quarters. Table 5 shows the correlation matrix between all variables under consideration.

The correlation coefficient matrix (Table 5) shows that there is no strong correlation among the variables. Gujarati (2007) argued that the problem of multi-collinearity exists if the correlation between independent variables is above 0.8. All the correlation coefficients between the independent variables were less than 0.8. As a result all variables were taken into consideration in the estimation of the regression model.

Table 6 shows the results for testing for equilibrium in the banking sector.

The PR model is only valid if the market is in longrun equilibrium. This long-run equilibrium is usually tested with a model in which the dependent variable is return on assets and the independent variables are the same as in the baseline model. The test for the long-run equilibrium was undertaken using the

Wald coefficient restriction test. The hypothesis on the long-run equilibrium in the Zimbabwean banking sector ( $E = \beta_1 + \beta_2 + \beta_3 = 0$ ) has to be accepted at the significance level of 5%. Using the Wald test,  $E = -0.0039$  and  $F(1, 372) = 1.7464$  (0.1871). The null hypothesis of the coefficients being equal to zero is accepted confirming that the Zimbabwe banking sector was in equilibrium during the period 2009-2014. The rationale for this test is that, in equilibrium, risk-adjusted rates of return should be equal across banks and returns on bank assets should not be related to input prices.

Table 7 shows the Hausman test of choosing between the random effects model against the fixed effect model.

Based on the Hausman test in table 7, the random effects model was rejected in favour of fixed effects. This means comparing the coefficients estimated by the fixed and random effects model indicate the fixed effects should be considered correct as best fit.

Table 8 shows the estimated H-statistic for the Zimbabwean banking sector. The H-statistic was estimated at 0.56. The null hypothesis  $H = 0$  had to be rejected ( $F(1, 372) = 260.2$  and  $\text{Prob} = 0.0000$ ) as well as the hypothesis  $H = 1$  with ( $F(1, 372) = 158.80$  and  $\text{Prob} = 0.0000$ ) using the Wald test. This shows that the banking sector in Zimbabwe is neither a monopoly nor perfectly competitive. The Zimbabwean banking sector can therefore be described as monopolistic competition since the H-statistic is between 0 and 1. Overall, the estimated H-statistic is positive and significant. The results compare favourably with those obtained for Zambia using the same method. Simpasa (2013) estimated the H-Statistic for Zambia at .46 implying that Zambian banks earned their revenue under conditions of monopolistic competition. This study also found that all the three input prices were positive and significant.

The dependent variable total revenue is positively related to the price of funds (W1), the cost of labour (W2) and the cost of capital (W3). Both the price of funds (PF) and price of labour (PL) variables have positive signs, meaning that increased factor costs leading to the higher revenue. All variables W1, W2 and W3 are statistically significant implying these three variables contribute to the H-statistic

The equity to assets ratio has a negative but insignificant coefficient. This result contradicts the findings by Simpasa (2013) who found a negative and significant coefficient in the study of the Zambian Banking sector. The study found that a large capital buffer aimed at maintaining banks' solvency imposes opportunity costs on their revenue performance.

The coefficient of LASS is negative but insignificant. The negative sign implies that the larger banks seem to be less efficient compared to smaller banks in revenue generation. This result could arise because of the diseconomies of scale factor which leads to declining revenues.

The results show that there exists a certain degree of monopolistic competition in the Zimbabwean banking sector, which is consistent with the results of most previous studies that used the same method. The results of the study are supported by Gutiérrez de Rozas (2007), and Bikker and Haaf (2002) who argued that monopolistic competition is ideal because the sector is prone to the

existence of product differentiation. Banks though sell different products with regard to product quality and promotion. The level of monopolistic competition is reduced as a result of perfect substitutability of the products. This means that banks are able to generate more revenue because of the uniqueness of their features such as brands, image and advertising. Other studies that found the same results are: Haffani (2002) who studied the structure of Tunisia's banking sector during the period 1980 to 1999 employing the Panzar-Rosse method. The results showed that the Tunisian banking sector operated in a monopolistic structure with increasing competition; Bikker and Haaf (2002) analysed 23 OECD countries over the period 1988 to 1998 and their results showed that the countries were operating in a monopolistic competition environment. They further found that competition seemed to be stronger for large banks and weaker for smaller banks; Weill (2004) studied twelve European countries during the period 1994 to 1999 using the yearly Tobit-based estimates of the H-statistic. The results showed that the banks were operating under a decreasing pattern of monopolistic competition in Spain.

For a robustness check, the process was repeated with the random effect model and the GMM method. The H-statistics obtained from the two methods are 0.54 and 0.51 for the random effect and generalised methods of moments respectively. These H-statistics compares favourably with the one from the fixed effects of 0.56. The two methods produced similar results as those obtained using the fixed effects model. This confirms that the Zimbabwean banking sector is operating under monopolistic competition. The other variables had the same coefficient signs as those obtained from the panel regression with fixed effects.

Table 9 confirms the results for the evolution of the Panzar and Rosse H-statistic over the period 2009 to 2014. The analysis of the developments of the Panzar-Rosse H statistics over the period 2009 to 2014 show that competition has evolved from monopolistic competition to perfect competition. There was an increase in competition during the study period with the H-statistic increasing from 0.47 in 2009 to 0.99 in 2014.

The results confirm that the introduction of the multi-currency caught most banks unawares without adequate foreign currency assets. These banks were not able to compete with better placed banks (mostly the foreign owned banks) as they readily had resources to undertake business. The lack of the lender of last resort and active interbank market meant that domestic banks were to rely on foreign banks for liquidity support. Foreign owned banks were at an advantage and thus restricted the level of competition. When banks adjusted to the multi-currency system, they were able to attract lines of credit and new clients increasing the level of competition in the banking sector.

Competition declined in the banking sector from 0.99 in 2012 to 0.92 in 2013. The decline in the H-statistic in 2013 reflects the banking controls that were put in place by the Government in 2013. The effect of the banking controls was to reduce competition in the banking sector reversing the benefits of liberalisation. Studies support financial reforms rather than financial repression. Delis (2012) argued that financial reforms and the quality of institutions are major determinants that promote competitive conduct of banks. This means



that the competitiveness of the banking sector increased through financial sector reforms in countries with stronger institutions which brought about financial innovation. Moyo and Nandwa (2014) argued that reforms are supposed to increase the amount of competition leading to financial innovation and efficiency. This argument is supported by Hauner and Peiris (2005) who argued that a high degree of competition and efficiency leads to financial stability, product innovation and access by households and firms to financial services. Policy makers should therefore take heed that competition can only be increased by financial liberalisation rather than financial repression.

## 6 Conclusion and recommendation

This paper undertakes an empirical assessment of the competitive conditions within the Zimbabwean banking sector between 2009 and 2014 under a multi-currency system arrangement. The assessment was undertaken, using the model popularised by Rosse and Panzar (1977) and Panzar and Rosse (1987); the P-R model. This method assesses the intensity of competition on the basis of a reduced form equation that explains revenue in terms of factor input prices and other explanatory variables. The three main objectives of this paper were: Firstly, to test for equilibrium within the Zimbabwean banking sector over the whole period 2009 to 2014; Secondly, to assess competition for the whole period under consideration; and thirdly to estimate the degree of competition for each year to ascertain the evolution of competition during the study period. The study employed a data set which consisted of a balanced panel of eighteen banks which subsisted during the whole study period. Overall the results show that the banking sector in Zimbabwe operates under monopolistic competition. These results are consistent with the findings of most previous studies using the same method. The results imply that banks are able to generate more revenue because of the uniqueness of their features such as brands, image and advertising.

The findings indicate that competition has evolved over the years in the banking sector since the introduction of the multi-currency system in 2009. In 2009 when multi-currency was adopted, competition in the banking sector was low with an H-statistic of 0.46. The intensity of competition started to increase in 2010 as banks adjusted to the new dispensation of multi-currency. Banks were able to operate and compete despite the lack of adequate foreign currency assets. The lack of the lender of last resort and active interbank market then meant domestic banks were to rely on foreign banks for liquidity support. This put foreign owned banks at an advantage hence restricting the amount of competition. After banks had adjusted to the multi-currency system, they were able to attract lines of credit and new clients, which increased the level of competition in the banking sector. Since 2011, the sector progresses towards perfectly competitive conditions with the H-statistic moving towards one.

An important observation from the results is that controls limit the amount of competition. The results show that the introduction of banking controls

by the Government in 2013 reduced the amount of competition in the banking sector. The Memorandum of Understanding which was announced by the government in February 2013, introduced controls on a liberalised sector, which weakened the functioning of demand and supply forces. The business conditions including the interest rates on deposit and investment accounts; on overdrafts, loans and advances were altered. The MoU restricted the amount of competition as these revenue streams were almost predefined by the authorities. This study therefore found that in a liberalised market, government controls distort the pricing and affect the competitiveness of the sector. The government should therefore desist from using controls.

Given the call by the Central Banks for banking institutions to adhere to the new capital thresholds by the year 2020 and progressively show commitment towards the same, there is a need for the Government of Zimbabwe to introduce a universal banking license. This will be in line with the new capital requirements which will allow those banks meeting the US\$100 million capitalisation to venture into all types of banking. Banking sector competition should also increase as a result of it

There are a number of policy implications that can be drawn from the study by the South African government. Measures meant to improve financial stability in the economy are likely to pose both positive and negative effects on the banking sector hence a cost benefit analysis should be undertaken before implementation. Economic stability nurtures an environment that improves financial intermediation hence is important for enhancing banking competition. Banking competition is important for economic growth, improved efficiency and improved access to finance. Tampering with competitive forces increases the cost of providing financial services. The Government should avoid tempering with market forces as this reduces banking sector competition.

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## Tables and Figures

**Table 1: Number of operating banks in Zimbabwe**

Type of Institution	December 2008	July 2012	July 2014
Commercial Banks	15	18	15
Merchant Banks	6	2	1
Discount Houses	3	0	0
Finance Houses	0	0	0
Savings Bank (POSB)	1	1	1
Building societies	4	4	3
Total	28	25	20

Source: Reserve Bank of Zimbabwe 2009, 2012, 2014

**Table 2: Zimbabwe's key financial indicators (2004-12)**

	04	05	06	07	08	09	10	11	12
Market share of top four banks	0.54	0.53	0.44	0.43	0.97	0.56	0.48	0.43	0.45
Regulatory capital to risk weighted assets	0.35	0.29	0.34	0.33	0.33	0.27	0.18	0.14	0.13
NPL to total gross loans	0.23	0.09	0.04	0.01	0.05	0.02	0.04	0.08	0.13
Return on assets	0.12	0.14	0.19	0.13	0.25	0.01	0.02	0.02	0.02
Return on equity	0.63	0.63	0.60	0.33	0.28	0.03	0.07	0.15	0.09
Interest margin/gross income	0.12	0.21	0.14	0.45	0.22	0.14	0.24	0.35	0.35
Non-interest expenses /gross income	0.28	0.25	0.18	0.24	0.02	0.86	0.70	0.65	0.66
Interest rate spread	0.29	0.27	0.45	0.21	0.31	0.03	0.06	0.09	0.09

Source: IMF Article IV

**Table 3: H-Statistic interpretation**

H-Value	Interpretation
H=0	Monopoly Equilibrium Perfect Colluding Oligopoly Conjectural variation short run oligopoly
$0 < H < 1$	Monopolistic competition free entry Equilibrium
H=1	Perfect competition Natural monopoly in a perfectly contestable market Sales maximizing firms subject to break-even constraints

Source: Rosse and Panzar (1977, 1982, 1987)

**Table 4: Descriptive statistics**

	LW1	LW2	LW3	LETA	LLTA	LTREV	LROA1	LROE1	LASS
Mean	-3.7636	-3.6606	-5.5462	-1.6858	-1.0329	-2.4324	0.0102	0.0480	8.1048
Maximum	-0.6530	-1.8440	-2.3100	-0.0930	-0.2520	-1.0190	0.2410	0.5410	9.2330
Minimum	-27.609	-9.210	-32.427	-3.330	-11.145	-6.398	-0.454	-1.766	6.453
Std. Dev.	1.7552	0.8811	2.21372	0.6318	1.0113	0.6982	0.0477	0.2419	0.4960
Observations	396	396	396	396	396	396	396	396	396

Source: Researcher's own calculation

**Table 5: Correlation matrix**

	LW1	LW2	LW3	LETA	LLTA	LTREV	LROA1	LROE1	LASS
LW1	1.000								
LW2	0.162	1.000							
LW3	0.203	0.384	1.000						
LETA	-0.120	0.070	0.025	1.000					
LLTA	0.426	0.062	0.241	-0.402	1.000				
LTREV	0.320	0.607	0.380	0.066	0.236	1.000			
LROA1	-0.036	-0.136	-0.0860	0.024	-0.031	0.286	1.000		
LROE1	-0.069	-0.168	-0.0928	-0.152	0.077	0.181	0.815	1.000	
LASS	0.152	-0.233	-0.039	-0.773	0.386	-0.142	0.076	0.298	1.000

Source: Researcher's own calculation

**Table 6: Test for equilibrium**

	Panel least squares with fixed effects			GMM		
	Dependent Variable: ln (ROA+1)			Dependent variable: ln (ROA+1)		
Variable	Coef.	t-statistic	Prob	Coef.	t-statistic	Prob
C	0.044593	0.571779	0.5678	0.260148	1.958800	0.0509
LW1	0.000661	0.426815	0.6698	-0.005308	-0.200110	0.8415
LW2	-0.004748	-1.476446	0.1407	-0.045484	-1.762276	0.0789
LW3	0.000171	0.138552	0.8899	0.006132	0.833846	0.4049
LETA	-0.009723	-1.308228	0.1916	-0.011478	-0.750835	0.4533
LLTA	0.001128	0.391924	0.6953	0.011826	0.465447	0.6419
LASS	-0.007838	-0.784338	0.4333	-0.050300	-2.034538	0.0426
	E= 0.000661+-0.004748+0.000171=-0.003916 =0 Chi-square 1.746421 (0.1863)			E=-0.005308+-0.045484+0.006132=-0.044660 Chi-square 0.9962 (0.3182)		

Source: Researcher's own calculation

**Table 7: Hausman specification test**

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	7.080653	6	0.3135

Source: Researcher's own calculation

**Table 8: H-Statistic test results: Testing competition**

Dependent variable: LTREV									
Variable	Fixed effect			Random effects			GMM		
	Coef.	t-stat	p-value	Coef	t-stat	p-value	Coef.	t-stat	p-value
C	0.8739	0.9539	0.3407	0.8112	1.0744	0.2832	0.2448	0.3933	0.6943
LW1	0.0510	2.8021	0.0053	0.0586	3.4119	0.0007	0.0653	3.8911	0.0001
LW2	0.4739	12.5440	0.0000	0.4450	12.4900	0.0000	0.4070	11.9549	0.0000
LW3	0.0365	2.5173	0.0122	0.0380	2.7721	0.0058	0.0342	2.5750	0.0104
LETA	-0.1540	-1.7647	0.0784	-0.0444	-0.5766	0.5645	0.0847	1.2494	0.2123
LLTA	0.0871	2.5747	0.0104	0.0972	3.0282	0.0026	0.1078	3.3722	0.0008
LASS	-0.1661	-1.4157	0.1577	-0.1428	-1.4109	0.1591	-0.0614	-0.6950	0.4875
R-squared =0.538412 Adjusted R-squared = 0.509873 F-statistic= 18.86579 (00000) H=0.051005+0.473863+0.03 6543=0.561411			R-squared = 0.456419 Adjusted R-squared = 0.448035 F-statistic= 54.43744 (00000) H=0.058574+0.444987+0.038 36=0.541597			H=0.065287+0.406992+0.034 202=0.506481			

Source: Researcher's own calculation

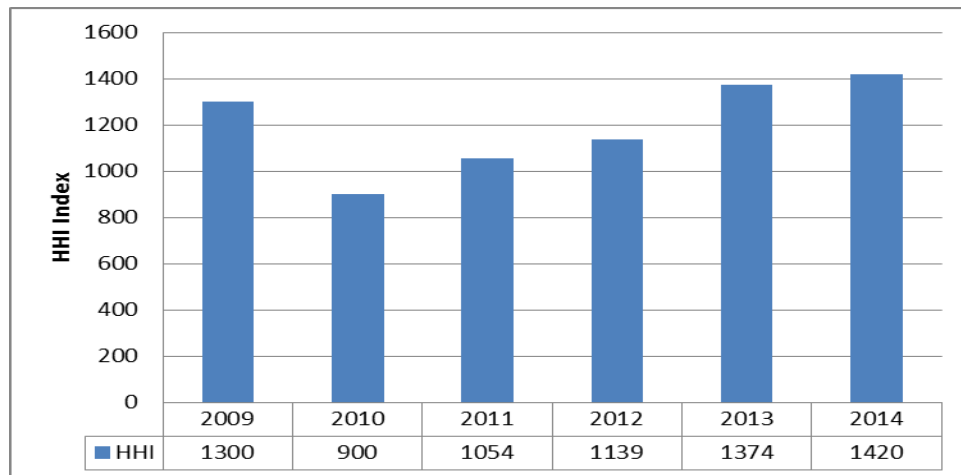


**Table 9: Developments of the Panzar-Rosse H-statistics over time – average competitive Indicator (2009-2014)**

YEAR	2009	2010	2011	2012	2013	2014
H-fixed	0.4579	0.8715	0.9507	0.9925	0.9200	0.9928
H-Random	0.3818	0.8689	0.9154	0.9841	0.8930	0.9352

Source: Researcher's own calculation

**Figure 1: Evolution of the HHI**



Source: Researcher's own computation