Assessing the Degree of Competition in Lesotho's Banking Industry*

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Abstract

Lesotho's banking industry is highly concentrated, and this raises concern about the extent of competition in the banking market. In this paper, we investigate the degree of competition in the banking sector in Lesotho. We employ the Panzar and Rosse (1987) $H-$statistic and the Boone (2008) indicator on a balanced monthly panel data set for all the commercial banks operating in Lesotho for the period 2013:10 to 2019:05. We find the $H-$statistic between -0.29 and -0.16, and the Boone indicator of -0.20, implying that the banking industry in Lesotho is a perfectly colluding oligopoly. We therefore argue that the authorities should actively encourage entry of more players into the industry, and set up the long anticipated competition authority to oversee conduct in the banking industry, and all other industries to improve societal welfare.

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1 Introduction

Competition in the banking sector has been a preoccupation of researchers and policy-makers alike in recent years, not just because of the recent financial crisis, but also because a competitive banking sector is critical for the proper functioning of the economy. Unlike any other industry, competition in the banking industry does not only affect social welfare, but also has implications for financial stability and hence other sectors of the economy. According to Vives (2010), rough competition in the banking industry may force banks to engage in riskier choices (e.g. over-expansion into risky lines of business) and increase the likelihood of failure, and hence financial instability. On the other hand, Cetorelli (2001) argues that intense competition in the banking industry improves welfare by lowering loan interest rates and increasing deposit rates as banks compete for credit extension to firms and loanable funds from households. This is because high banking competition forces banks to increase their efficiency and improve quality of their financial services by coming up with innovative ways of doing business (Degryse et al., 2015).

Further, a competitive banking sector is essential to monetary policy in that banks respond appropriately to monetary tightening and/or easing. According to Van Leuvensteijn et al. (2011) and Fungáčová et al. (2014), the transmission of monetary policy via the bank lending channel in the Euro area is more pronounced in a highly competitive banking industry. Therefore, the impact of monetary policy on financial prices (i.e. exchange rates and interest rates) and money supply depends, to a large extent, on bank market power (Fungáčová et al., 2014; Simbanegavi et al., 2014). And excessive bank market power hampers economic growth (Claessens and Laeven, 2004).

Given the importance of competition in the banking sector for the overall health of the economy, determining the nature and extent of banking competition is of great interest to researchers and policy makers alike. Nonetheless, research on this topic has largely focused on developed countries and a few emerging market countries. For example, Bikker and Haaf (2002) and Van Leuvensteijn et al. (2011) assess the degree of banking competition in, respectively, developed countries and the Euro area. Further, Bikker et al. (2012) assess banking competition in 63, mostly developed, countries across the world including 3 sub-Saharan countries; Kenya, Nigeria and South Africa. On the other hand, Fosu (2013) examines banking competition in Africa's subregional markets, but does not measure competition in individual countries' banking sectors.

There are a few country studies that assess banking competition in Africa (see Simatele (2015) and Simbanegavi et al. (2014) for South Africa, and Mlambo et al. (2012) of South Africa, Nigeria, Egypt, and Algeria). According to Mlambo et al. (2012), financial sector reforms in the four African countries they study seem to have improved competition in the banking sector. Lesotho, like many other African countries implemented financial sector reforms in the 1990s and early 2000s, but the question of whether banking competition has improved since then still remains open. Even though there is general perception by policy makers in Lesotho that banking sector is both concentrated and uncompetitive (see Mashayekhi et al., 2013), there is no study, to best of our knowledge, that

assesses the nature and degree of banking competition in Lesotho. Further, it is still unknown whether this degree of banking competition is declining or increasing. This paper, therefore, aims to fill this research gap. By so doing, this paper contributes to literature on banking competition in small economies that are part of a monetary union, and public policy discourse on banking industry competition in Lesotho.

Using the monthly panel data on four commercial banks in Lesotho between October 2013 and May 2019, we first examine the evolution of the degree of concentration within the banking sector. Second, we estimate the degree of banking competition using the Panzar-Rosse H-statistic, which is one of the widely used new empirical industrial organization (NEIO) techniques to analyse the degree of competition (Panzar and Rosse, 1987; Bikker and Haaf, 2002; Van Leuvensteijn et al., 2011; Bikker et al., 2012; Simbanegavi et al., 2014; Simatele, 2015). We find the $H-$statistic ranging between -0.29 and -0.16, depending on whether we use interest income or total income as the dependent variable. This shows that Lesotho's banking sector is a perfectly colluding oligopoly. Third, because the H-statistic has been shown to be uninformative under certain conditions (Bikker et al., 2012; Shaffer and Spierdijk, 2015), we also estimate the degree of banking competition using the new method, the Boone Indicator proposed by Boone (2008) and applied by Van Leuvensteijn et al. (2011) in the Euro area and Mirza et al. (2016) in Pakistan. Consistent with the Panzar-Rosse method results, we also find that Lesotho's banking sector is highly uncompetitive with a Boone indicator of -0.2046, and there is suggestive evidence that the degree of competition has been on the decline during the study period. These findings will likely trigger policy makers to fast-track the introduction of the long-contemplated competition authority (see for example, Mashayekhi et al. (2013)), and to amend and/or introduce policies aimed at stimulating competition in Lesotho's banking industry in particular.

The rest of the paper proceeds as follows. Section 2 provides the background of Lesotho's banking industry. Section 3 discusses the literature on measuring competition in the banking industry. Section 4 presents and discusses the theoretical basis for the Panzar-Rosse method and the Boone indicator. Section 5 discusses the data used and presents the applied econometric methods for the Panzar-Rosse method and the Boone indicator. Section 6 presents and discuss the main results. Section 7 conclude the paper.

2 The institutional background

The formal banking in Lesotho dates back to 1904, when Standard Bank, a British Bank, established a branch in Maseru (Maruping, 1992; Ambrose, 1993, cited in Maliehe, 2018). Participation of foreign banks increased when Barclays Bank came to Lesotho in 1957. Barclays Bank focused more on corporate than individual clients. In 1969, the Standard Bank (of South Africa) merged with the Chartered Bank (of the United Kingdom) to form the Standard Chartered Bank (Standard Bank of South Africa, 2018). After the merger of Standard and Chartered Banks, the Lesotho

operation of Standard Bank also assumed the name "Standard Chartered Bank".[1]

In 1972, the government of Lesotho established the Lesotho Bank. This was necessitated by two issues: (1) the government's realisation that commercial banks were largely savings institutions mobilising funds in Lesotho and channelling them to the South African market and were not lenders of credit in Lesotho[2] (World Bank, 2004), (2) and that commercial banks were paying customers very low interest rates on their deposits. The introduction of Lesotho Bank was intended to fill this gap. The initial plan was for the bank to serve as both a commercial bank and a development bank, but it operated as a commercial bank only (Maruping, 1992). The bank's main focus was to serve mostly businesses owned by Basotho and foreign owned companies operating in Lesotho.

Participation of state owned banks increased in 1980 when the government established the Lesotho Agricultural Development Bank (LADB) (Government of Lesotho, 2000). As a result, there were now three commercial banks - Barclays Bank, Standard Chartered Bank, and Lesotho Bank - and one development bank operating in Lesotho. The LADB was established mainly to provide financing for agricultural projects. As a state bank with a development mandate, the LADB extended credit that was largely financed through grants as well as concessional loans from international organizations. In the late 1980s, the LADB increased its branch network to various districts of the country. The bank's increased capacity was, however, not been fully utilized because some of the areas where the bank had established branches were less populated and there was little activity (Maruping, 1992). This rapidly increased the bank's operating costs relative to its income, and this would be one of the main contributing factors to the bank's collapse in 1998.

The banking sector continued to experience major structural changes from mid-1990s to early 2000s as part of the financial sector reform wave that was sweeping across the continent (see for example, Mlambo et al., 2012). In 1995, Standard Bank took over the Barclays Bank. NedBank later joined the banking industry in January of 1997 by acquiring the Standard Chartered Bank (Lesotho). NedBank started with a branch in Maseru, and mobile agencies in other districts of the country, (NedBank Lesotho, 2017). As already mentioned, the LADB was closed in 1998 following years of heavy losses and liquidity problems (Government of Lesotho, 2000). In 1999, Lesotho Bank was partially liquidated following years of poor financial performance and Standard Bank purchased a 70 percent share in the bank. The bank then assumed the name Standard Lesotho Bank (SLB).

In mid 2000s, two more banks entered the market: First National Bank (FNB) Lesotho, a subsidiary of FNB South Africa, entered the market in 2004, and Lesotho PostBank (LPB), which is wholly owned by the government of Lesotho, entered in 2005. Although the LPB was incorporated in 2004, it only began its operations in 2005. The LPB was established with the goal of providing banking services to under-banked and unbanked Basotho in the rural and urban areas of the

[1] See https://www.nedbank.co.ls/content/nedbank-lesotho/desktop/lt/en/aboutus/about-nedbank-lesotho/who-we-are/Our-history.html, (last accessed on 2nd August 2019).

[2] This has, in fact, been the case since the introduction of formal banking in Lesotho, and the banks actually presented themselves as such (see Maliehe, 2018, p.244).

Table 1: Banks' Market Share of Assets by Ownership (%)

	2013	2014	2015	2016	2017	2018
Number of Banks	4	4	4	4	4	4
Foreign Banks	97.25	97.17	97.17	93.86	91.90	91.54
Domestic Banks	2.75	2.83	2.83	6.14	8.10	8.46
Total	100	100	100	100	100	100

Source: Own calculations based on Central Bank of Lesotho data.

country. It started by only offering savings and deposit taking services up until 2010 when it began extending credit as well. The bank only introduced electronic transacting services in 2012.[3] Therefore, it is reasonable to believe that the LPB only became a real competitor in the banking industry post 2010. There are currently four commercial banks in Lesotho's banking industry.

We now provide an overview of the developments in the banking industry for the period 2013–2019. Table 1 shows changes in banks' asset market share over the period. As we can see from the table, the banking industry in Lesotho is dominated by foreign owned banks. Of all the 4 banks, 3 of them -First National Bank, NedBank, and Standard Lesotho Bank - are South African owned.[4] The three foreign banks accounted for about 97 percent of total banking sector's assets in 2013, with LPB taking about 3 percent. What is clear from table 1 is that, in terms of assets, LPB's market share has increased by about 6 percentage points, from 2.75 percent in 2013 to 8.46 percent in 2018, while the market share of foreign banks has been on the decline. This seems to indicate that the introduction of LPB has brought some competition in the sector.

3 Literature Review

In this section, we review the theoretical literature on different methods of measuring competition in the banking industry, and briefly discuss the empirical studies that use each of the the methods to analyse the competitiveness of the banking markets.

The literature on measuring competition in the banking industry can be broadly categorised into two main approaches: the structural (or traditional industrial organization) approaches, and the non-structural (or new empirical industrial organization) approaches (Claessens and Laeven, 2004; Degryse et al., 2015). Under the traditional approaches, we have the structure-conduct-performance (SCP) hypothesis, the efficient-structure hypothesis, and studies of scale and scope economies. Within the new empirical industrial organization (NEIO) approaches, we have Panzar and Rosse (1987), the Boone (2008) indicator, the conjectural variations models and structural

[3] see https://www.lpb.co.ls/#lpb_modal, (last accessed on 2nd August 2019).

[4] eSwatini (formerly Swaziland), Lesotho, Namibia and South Africa are members of the Common Monetary Area (CMA), within which there is free movement of capital. Therefore, the domination of South African banks in other CMA countries' banking industries is to be expected given that South Africa has one of the largest and most sophisticate financial sectors in Africa (Mlambo et al., 2012).

demand models, which measure the degree of competition directly without using market structure indicators. See Degryse et al. (2015) for a detailed discussion on these approaches. The structural methods emanate from the structure-conduct-performance (SCP) hypothesis, which argues that there exist a negative relationship between market structure and performance of banks. The main prediction of this hypothesis is that high degree of concentration leads to less competition and higher profitability.

According to the SCP hypothesis, the high concentration in the banking market leads to non-competitive bank conduct and, hence, higher bank profitability (Bikker and Bos, 2008; Degryse et al., 2015). Therefore, concentration indices - an n-bank concentration ratio and the Herfindahl–Hirschman Index (HHI) - are widely used indicators of market structure and hence market power under structural approach. To test the SCP hypothesis, bank performance, say bank profitability, is regressed on either of these concentration indices, and a significantly positive coefficient on the concentration index is taken as evidence for the hypothesis. The argument for this result is twofold. First, fewer banks in the market are likely to collude due, in part, to lower coordination costs. Second, even without banks colluding, banks with larger market shares are likely to have high market power that they may use to their advantage (Van Leuvensteijn et al., 2011).

However, Demsetz (1973) contents that it is not clear whether the positive relationship between market concentration and profitability is due to efficiency or monopoly power. According to the efficiency hypothesis, more efficient firms (due to superior production technologies or efficient scales) enjoy higher profits, grow larger market shares, leading to higher market concentration (Van Leuvensteijn et al., 2011; Degryse et al., 2015; Khan et al., 2018). In this way, both structure and performance are determined by efficiency. Therefore, efficiency hypothesis is tested by regressing bank profitability on market share controlling for market concentration. A positive and statistically significant coefficient on market share is considered as sufficient support for the efficiency hypothesis.

A major problem with the SCP and the efficiency hypotheses relates to implicit assumption that market structure is exogenous. Tirole (1988) argues that the classical test for the SCP hypothesis cannot identify the causal relationship between structure and performance, through conduct. As Degryse et al. (2015) explains, much of the literature testing the SCP hypothesis does not take into account the conduct of the banks in the market and the impact of performance of the banks on market structure. Therefore, in their test of the SCP hypothesis in the Association of South East Asian Nations (ASEAN), Khan et al. (2018) addresses this limitation by incorporating the role of bank conduct as the mediating variable between structure and performance. They find that higher profits in concentrated banking markets are partly explained by uncompetitive banks' conduct. However, Khan et al. (2018) measure market conduct using the Panzar-Rosse $H-$statistic, a sum of elasticities of banks revenue to changes in input prices, which is an unreliable indicator of market conduct (Bikker et al., 2012; Shaffer and Spierdijk, 2015).

The limitations of structural models let to the emergence of non-structural approaches (or the

New Empirical Industrial Organisation (NEIO)) to measuring market competition. The major advantage of NEIO measures of competition over traditional structural methods is that the NEIO approaches are derived formally from economic theory of firm's profit maximization conditions. The two widely used non-structural models in measuring market power are (1) the Bresnahan-Lau (or conjectural variations) model advanced by Bresnahan (1982, 1989) and Lau (1982), and (2) the Panzar-Rosse reduced-form revenue test model by Panzar and Rosse (1987). Both these methods are formally derived from profit-maximizing equilibrium conditions and their test statistics are systematically related to each other (Shaffer, 1983; Bikker et al., 2012).

The Bresnahan-Lau (or conjectural variations) model is premised on the idea that when the bank chooses its output, it takes into account how other competitor banks in the market will react to its output change (Degryse et al., 2015). Under perfect competition where prices are equal to marginal costs, an increase in bank i's output will result in a decrease in the output level of all other rival banks, which would exactly equal the magnitude of the initial increase in bank i's output. In this case, the conjectural variation equals 0. On the other hand, if the market is characterised by perfect collusion or monopoly, the increase in bank i's output will be matched by an equal increase in the output of all other banks in the industry. This would give a conjectural variation that is equal to 1. The key advantage of this model is that it can even be employed using only aggregate sector data rather than firm-specific data.

Simbanegavi et al. (2014) and Mirza et al. (2016) employ the conjectural variations method in South Africa and Pakistan, respectively, and find that both the South African and Pakistani banking sectors are characterised by monopolistic competition. However, this model has been criticised on the grounds that efficient collusion cannot be distinguished from Cournot competition (Corts, 1999). Further, it cannot be reliably used when the time series is short as in our case.

The second NEIO technique is the Panzar-Rosse approach by Panzar and Rosse (1987). The Panzar-Rosse model uses the measure known as the $H-$statistic, which is the sum of the elasticities of the reduce-form revenues with respect to changes in the input prices, to assess the level of competition in the industry. The $H-$statistic ranges between $-\infty$ and 1. Economic theory states that under monopoly, a rise in firms' input prices increases marginal costs. As input prices increase, firms reduce their output, which consequently reduces revenues. In this case, the $H \leq 0$ (Bikker et al., 2012). Under perfect competition, increases in input prices cause revenue to increase by the same magnitude as input prices. This is consistent with $H = 1$. Finally, if the market the market is an ologopolistic or monopolistic competition, firms' revenues decline in reaction to increases in costs of inputs. However, the decline in revenues is of a less magnitude than the increase in input prices. This results in $0 < H < 1$ (Claessens and Laeven, 2004). These market power predictions using the $H-$statistic depend crucially on the assumption that the firms are in long-run equilibrium (Panzar and Rosse, 1987).

The Panzar-Rosse model has a number of appealing features that makes it arguably the most used non-structural method of assessing competition in banking industries. The model uses bank-

level data, which is readily available from the banks' balance sheets and income statements. Brissimis and Delis (2011) argues that since the Panzar-Rosse methodology utilizes bank-level data, it allows for bank-specific differences in the production function. Shaffer (2004) adds that, since the Panzar-Rosse model uses only bank-level data, it is robust to the extent of the market as no specific market definition is required in the revenue equation. Nonetheless, the Panzar-Rosse method has some serious shortcomings. First, it assumes that all firms are profit maximising, while in practise this might not be the case. For example, the objective of a state-owned bank may not be profit maximizing but to provide banking services at affordable costs, which may not be profit maximizing. Second, the $H-$statistic can be uninformative than previously believed. Bikker et al. (2012) show that the $H-$statistic can be negative under certain conditions such as short-run equilibrium and even under long-run equilibrium when the average cost function if flat. Further, Shaffer and Spierdijk (2015) also show that the $H-$statistic can be positive under conditions of substantial market power. Therefore, the $H-$statistic can take either sign for any degree of competition.

A number of cross-country studies have applied the Panzar-Rosse technique to measure the degree of banking competition in different countries and find that many baking markets are monopolistically competitive. For example, Bikker and Haaf (2002) for the European banking markets, Claessens and Laeven (2004) for banking markets in fifty countries (both developed and developing countries), and Bikker et al. (2012) for 63 (mostly developed) countries. Fosu (2013) also use the Panzar-Rosse model to examine competition across sub-regional banking markets in Africa between 2002 and 2009. He similarly finds that all the African sub-regional banking markets exhibit monopolistic competition, and that the structural reforms in Africa banking markets have likely contributed to enhance banking competition. Although Lesotho was included in Fosu (2013), he does not show the degree of banking competition by country.

Some single country studies using the Panzar-Rosse approach include Aktan and Masood (2010) for the Turkish banking industry, Mirza et al. (2016) for Pakistan, and Simatele (2015) and Simbanegavi et al. (2014) for South Africa. All these studies find evidence for monopolistic competition in the respective banking markets. However, Aktan and Masood (2010) do not control for effects of non-performing loans on banks revenues and this may bias the $H-$statistic.[5]The third and relatively new non-structural method to measuring banking competition is the Boone Indicator model (Boone, 2008). The Boone Indicator is based on the observation that an increase in competition will result in higher market share for more efficient (i.e. lower marginal costs) firms than less efficient ones, and this competition effect gets stronger with competition intensity. Van Leuvensteijn et al. (2011) argue that this method is closely related to the efficiency hypothesis discussed

[5]Barbosa et al. (2015) extends the Panzar-Rosse model to study the difference in behaviour and conduct of banks that offer only banking services and those that offer additional services such as insurance services. They find that banks that provide typical banking services (e.g., loans and credit cards) plus additional services like brokerage and insurance services have higher market power than banks offering only typical banking products due to economics of scope. The Barbosa et al. (2015) approach is, however, more applicable in advanced banking markets where banks offer additional services such as insurance, life insurance and bonds.

above. But unlike the other measures of competition, it can be used to measure competition of bank industry segments like the loan market (Van Leuvensteijn et al., 2011). This method has been used by Van Leuvensteijn et al. (2011) to measure competition in the loans markets of the Euro area and by Mirza et al. (2016) to measure banking competition in Pakistan.

Although a number of studies in banking competition has increased in recent years, research in African banking markets is still scanty, and none exists for Lesotho. Hence, this study contributes to the ongoing research in banking competition by providing a detailed analysis of banking competition in Lesotho. Further, we use the well-known Panzar-Rosse method and, given its limitations, complement it with the Boone indicator.

4 Methodology

In this section, we outline the methodologies that we use to assess the degree of competition in the Lesotho's banking industry. We first present the Panzar-Rosse methodology and the empirical reduced-form revenue function to implement it. We then present the Boone Indicator theoretical model and its empirical counterpart.

4.1 The Panzar-Rosse methodology

4.1.1 The theoretical model

The Pazar-Rosse model is based on the microeconomic foundation that the objective of a firm is profit maximization. Assume that the profit function of a profit-maximizing bank is given as:

$$\Pi_i = R_i(y_i, n, Z_i) - C_i(y_i, w_i, X_i) \tag{4.1}$$

where Π_i denotes profit of the ith bank, R_i and C_i are, respectively, the revenue and cost functions of the ith bank, y_i is bank i's output level, n is the number of banks in the industry, w_i is the vector of input price of bank i while Z_i and X_i stand for vectors of exogenous variables that could shift bank i's revenue and cost functions, respectively. Therefore, taking the first derivative of the profit equation to derive the profit maximizing condition for bank i yields:

$$R_i^{'}(y_i, n, Z_i) = C_i^{'}(y_i, w_i, X_i) \tag{4.2}$$

where $R_i^{'}$ and $C_i^{'}$ denote the marginal revenue and marginal cost of bank i, respectively. And to determine the optimal number of banks in the industry, the zero (industry) profit constraint must hold such that the total revenue equation becomes:

$$R_i^* = R^*(y_i^*(n^*, Z_i, w_i, X_i)) \tag{4.3}$$

where $y^* = y_i^*(Z_i, w_i, X_i)$ is the profit maximising output level, and all other variables with asterisk denote equilibrium values.

Market power is therefore measured by the extent to which the equilibrium revenues changes as a result of changes input factor prices. Therefore, Panzar and Rosse (1987) defines the H-statistic, a measure of market power, as the sum of elasticities of the reduced form revenue function with respect to input factor prices, and it is given as:

$$H = \sum_{k=1}^{K} \frac{\partial R_i^*}{\partial w_{ki}} \cdot \frac{w_{ki}}{R_i^*}, \tag{4.4}$$

where w_{ki} is factor k input price for the ith bank and R_i^* represents equilibrium revenue for bank i. Both the sign and magnitude of the $H-$statistic are important in determining market structure. When the $H \leq 0$ we have a monopoly or perfectly colluding oligopoly market, and $H = 1$, the market is perfectly competitive. Monopolistic competition is consistent with a $0 < H < 1$.

In assessing the degree of competition, Panzar and Rosse (1987) make some assumptions concerning the way banks conduct themselves. First, it assumes that individual bank's prices change in response to changes in cost of inputs, depending on the nature of the market structure and level of competition that the banks face. For example, in the extreme case of a monopoly, the bank would have a flexibility to adjust the prices and or output knowing that it is the sole player in the market. On the other hand, where there are many market players, each bank would have to take into account actions of other banks before adjusting prices or output. Second, it assumes that banks are profit-maximizing firms with the sole role of intermediation. However, given the substantial and increasing share of non-interest revenue to total banks' revenue, it is possible that banks' role is not just intermediation (Tarus et al., 2012). Hence, in this paper, we consider both the interest and non-interest revenue. Third, the Panzar-Rosse model assumes that the increases in input costs are not related with higher revenues resulting from improved quality of services because this would bias the computed $H-$statistic.

4.1.2 The empirical model

We follow Bikker et al. (2012) and Simbanegavi et al. (2014) and use the following empirical version of the reduced-form revenue equation to obtain the $H-$statistic:

$$\ln INT_{it} = \beta_0 + \beta_1 \ln LP_{it} + \beta_2 \ln DP_{it} + \beta_3 \ln CP_{it} + \beta_4 \ln LLP_{it} + \beta_5 \ln LTA_{it} + \beta_6 \ln EQTY_{it} + \beta_7 \ln OI_{it} + \varepsilon_{it} \tag{4.5}$$

where the subscripts it denote bank i in time (or month) t, $\ln INT$ is the natural log of total interest income, which is a proxy for bank's income, $\ln LP$ is the ratio of staff costs to total assets, a proxy for unit price of labour, $\ln DP$ is the ratio of interest expenses to total deposits a proxy for

total cost of deposits, and lnCP is the ratio of other operating expenses to total fixed assets which is a proxy for the price of capital. The bank-specific factors are lnLLP, lnLTA and ln$EQTY$, which, respectively, denote the ratio of non-performing loans to total loans, loans to total assets, and equity to total assets. These factors are included to reflect differnces in risk, cost, size, and structure of banks; $lnOI$ represents the ratio of other income to total assets, and is intended to capture the effect of changes in banks' other income on interest revenue; ε is the random error term.

As indicated by Simatele (2015), the selection of dependent variable depends on whether the researcher assumes the main function of the commercial banks is intermediation or if other revenue sources are as important. If the banks' main function is intermediation, then interest revenue should be the dependent variable, otherwise we should use total income (i.e. the the sum of interest and non-interest revenue) (Simatele, 2015). Therefore, given that a significant share of banks' revenue in Lesotho composes of interest revenue, we assume that the core business of the banks is intermediation. However, we also include the results based on total revenue as a robustness check.

We estimate equation 4.5 using the fixed effects (within) regression method with **?** standard errors (see **?**), but we also show results from the pooled OLS and pooled Feasible Generalised Least Squares method (FGLS) following Bikker et al. (2012) and Simbanegavi et al. (2014). We calculate the $H-$statistic as the sum of elasticities of revenue to changes in cost of inputs, that is $H = \beta_1 + \beta_2 + \beta_3$.

For the Panzar-Rosse model to be implemented, it is required that the market be in long-run equilibrium. Following the literature, we test this assumption by estimating the model outlined in equation 4.6 where we replace the dependent variable with the return on assets (ROA), which equals the ratio of net income to total assets. The estimated model is as follows:

$$\ln(1+ROA_{it}) = \beta_0+\beta_1\ln LP_{it}+\beta_2\ln DP_{it}+\beta_3\ln CP_{it}+\beta_4\ln LLP_{it}+\beta_5\ln LTA_{it}+\beta_6\ln EQTY_{it}+\beta_7\ln OI_{it}+\varepsilon_{it} \tag{4.6}$$

Since ROA has a potential of taking on small negative values hence making it impossible to take the natural logarithm, most studies use the modified dependent variable as $\ln(1 + ROA_{it})$ (Claessens and Laeven, 2004). Equation 4.6 is also estimated using the Feasible Generalised Least Squares method (FGLS). The $H-$statistic based on the return on assets (H_{ROA}) is calculated and is defined as $\beta_1 + \beta_2 + \beta_3$. The long-run equilibrium condition is satisfied when ($H_{ROA} = 0$). The intuition underlying the long-run equilibrium test is that, under free-entry equillibrium among homogeneous firms, market forces should equalize ROA, such that ROA is not influenced by changes in input prices (Shaffer, 1983). Bikker et al. (2012) show that this test is actually a joint test of both competitive conduct and long-run structural equilibrium such that $H_{ROA} < 0$ is consistent with monopoly, oligopoly, or short-run (not long-run) competition, and implies that $H < 0$.

4.2 The Boone Indicator

We now explain the Boone Indicator model and provide its empirical specification as used in this paper. To aid our exposition of the model, we borrow heavily from Boone (2008) and Van Leuvensteijn et al. (2011).

4.2.1 The theoretical model

We assume that each bank i in the banking industry produces only one product q_i (or a portfolio of banking products), and is faced with the following demand curve

$$p(q_i, q_{j\neq i}) = a - bq_i - d\sum_{j\neq i} q_j \tag{4.7}$$

and has constant marginal costs MC_i. From equation 4.7, a denotes its market share, b is the elasticity of demand for q_i, and d represents the degree of substitutability between outputs of different banks in the industry, q_i and q_j, as perceived by the consumers. Bank i chooses its output level q_i that maximises its profits

$$\pi_i = (p_i - MC_i)q_i \tag{4.8}$$

We impose the restrictions that $a > MC_i$ and $0 < d \leq b$. Then the first order condition for the Cournot-Nash equilibrium is given as

$$a - 2bq_i - d\sum_{j\neq i} q_j - MC_i = 0 \tag{4.9}$$

Further assuming that there are N banks in the industry, each producing a positive output level, the solution for the N first-order conditions 4.9 is given as

$$q_i(C_i) = \frac{\left(\frac{2b}{d} - 1\right) a - \left(\frac{2b}{d} + N - 1\right) MC_i + \sum_j MC_j}{[2b + d(N-1)]\left(\frac{2b}{d} - 1\right)} \tag{4.10}$$

Bank i's profit π_i represents only variable profits excluding entry costs γ_i such that each bank i enters the industry if, and only if, it can recoup its entry costs. That is, iff $\pi_i \geq \gamma_i$. Equation 4.10 provides the relationship between output and marginal costs, and, therefore, the profit function $\pi_i = (p_i - MC_i)q_i$ is quadratic function of marginal costs. Further, equation 4.10, suggests that if a bank has higher marginal costs, its output will decline.

4.2.2 The empirical model

According to Boone (2008), there are two ways in which competition can be intensified; (1) when the degree of substitutability of banks' products increases (i.e. d increases), and (2) when entry

costs γ_i decline. The output level (and hence market share and profit) of the most efficient (or lower marginal costs) firm increases under both scenarios.

Therefore, Van Leuvensteijn et al. (2011) states that equation 4.10 supports the following market share model, which is used to determine the degree of competition in the banking industry:

$$\ln s_i = \alpha + \beta \ln MC_i \tag{4.11}$$

where $s_i = {}^{p_i q_i}/_{\sum_j p_j q_j}$ is the market share of bank i. β is the elasticity of bank i's market share (or profit) with respect to its marginal costs, and it is referred to as the Boone indicator.

Because bank i's marginal costs cannot be directly observed, Van Leuvensteijn et al. (2011) estimate the translog cost function to calculate them. We, however, follow Mirza et al. (2016) and approximate marginal costs with average costs. Therefore, we estimate the Boone indicator using the following market share model (or Boone's equation):

$$\ln s_{it} = \alpha + \beta \ln AC_{it} \tag{4.12}$$

where AC_{it} is the average costs, and subscript it refers to bank i in time t given that we estimate equation 4.12 using panel data. Next we discuss the data and present some descriptive statistics.

5 Data and Descriptive Statistics

The section first describes the data used in this paper, and then provides some descriptive statistics.

5.1 Data

We use a balanced monthly panel data set for all four commercial banks operating in Lesotho for the period 2013:10 to 2019:5. This data was obtained from the Central Bank of Lesotho. We have chosen to restrict the period of analysis to 2013:10 to 2019:5 mainly due to the availability of data. For years prior to 2013, we could not get all the data, hence there too many missing data points, and this could then undermine the credibility of our results.

Table 2 reports the summary statistics of the variables used in this paper. Interest income and Other income (OI) are recorded in thousands of maloti.[6] We can see from the table that the average monthly interest revenueover the study period is about M28,145. There is huge variability in interest revenue, with the standard deviation of about 24557, the between banks'variation of about 27512, and the within banks' variation of 5765. In a competitive market, firms' market shares are evenly distributed, such that no firm has market power. Therefore, the large variability

[6] 1 Loti (LSL) = 1 Rand (ZAR), 1 US$ = M15.42 as of 15 August 2019. Source: bloomberg.com/markets/currencies.

Table 2: Summary Statistics

Variables	Number of Banks	Number of Months	Mean	Overall Std.Dev.	Between Banks Std.Dev	Within Banks Std.Dev
Interest Income	4	68	28145	24557	27512	5765
Deposit Price	4	68	0.00309	0.00157	0.00163	0.00068
Labour Price	4	68	0.00289	0.00137	0.00123	0.00086
Capital Price	4	68	0.0896	0.0474	0.0346	0.0367
EQTY	4	68	0.122	0.0434	0.0331	0.0325
LTA	4	68	0.380	0.0920	0.0671	0.0712
LLP	4	68	0.0164	0.00676	0.00332	0.00612
OI	4	68	13573	10747	11764	3366
Total observations	272					

Source: Own calculations based on data from Central Bank of Lesotho. *Notes*: Deposit price equals the ratio of interest expenses to total deposits. Labour price equals the ratio of staff costs to total assets. Capital price equals the ratio of other operating expenses to total fixed assets. EQTY is a bank-specific factor measured as the ratio of equity to total assets, LTA is a bank-specific factor measured as the ratio of loans to total assets. OI is other income in maloti.

of interest revenue between banks suggests that we have some banks that are highly dominant and hence have some degree of market power.

Looking at the input prices, the average costs of capital are about 9 percent of the total fixed assets, the deposit and labour price average about 0.3 percent of total deposits and total assets, respectively. There is more between than within variation in the deposit price, labour price and other income (OI), while the reverse is true for variables EQTY, LTA, and LLP.

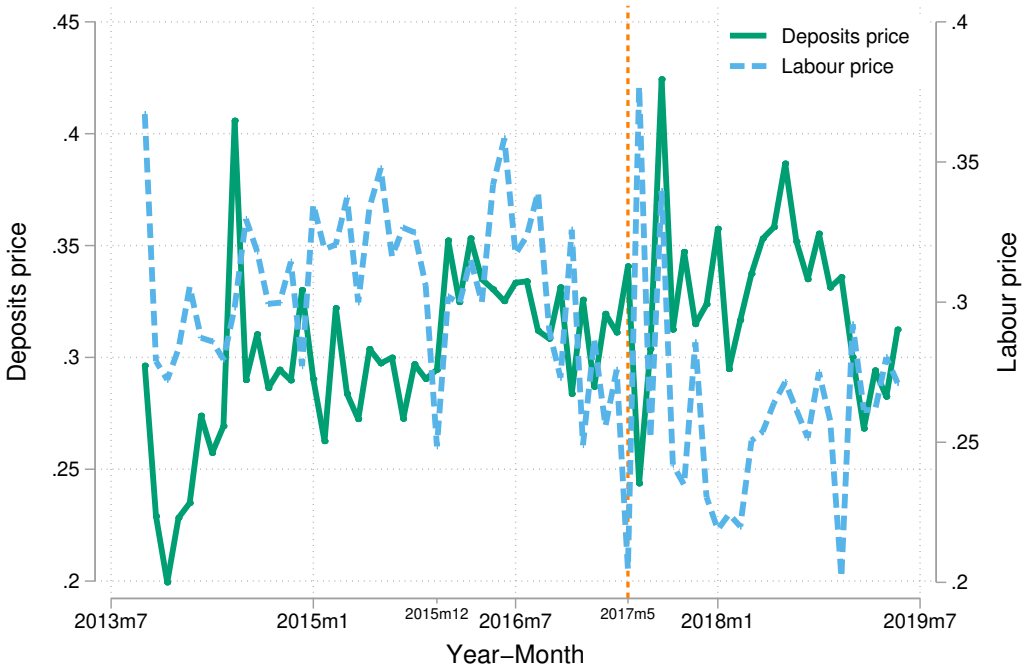
5.2 Descriptive statistics

Figure 5.1 shows trends in unit costs of deposits and labour. We can see from the figure that both the deposit price and labour price have been fluctuating between 0.2 percent and 0.4 percent for the entire period, and averaging around 0.3 percent. Further, the figure shows that there was a huge drop (increase) in the price of deposits (labour) in and around June 2017, a month after the hotly contested national elections whose period is marked by the dash-dash vertical line.

Figure 5.2 presents the tends in unit price of capital. We can see that capital price has been increasing over the period, more so during the period of heightened political uncertainty. This suggests that either the banks' operating costs have been increasing or their fixed assets have been declining during this period. If the increase in capital price is due to the former, it therefore signals that the banks are inefficient and the market is potentially uncompetitive.

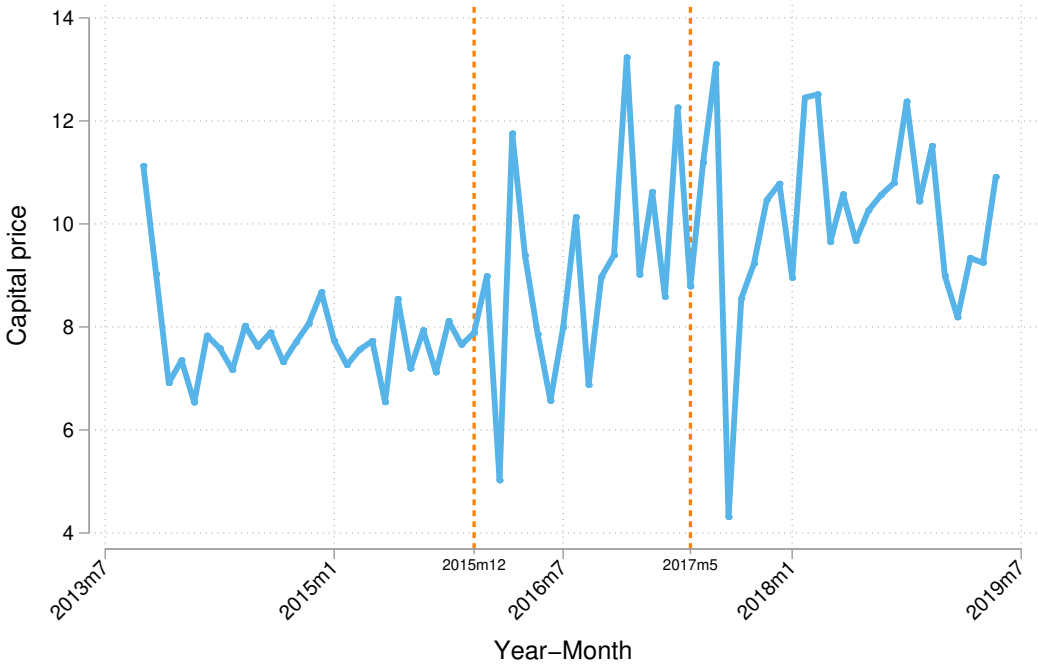
Table 3 presents the correlation matrix, which depicts the linear relationships between all the variables used in this study. The correlation coefficients only show the direction and strength of the association between the two variables. We can see that there is a statistically strong correlation between input prices and the interest revenue. The correlation between price of deposits and

Figure 5.1: Costs of Deposits and Labour: 2013–2019



Source: Own calculations based on data from Central Bank of Lesotho. *Notes*: Deposit price equals interest expenses as a percent of total deposits. Labour costs equals staff costs as a percent of total assets.

Figure 5.2: Costs of capital: 2013–2019



Source: Own calculations based on data from Central Bank of Lesotho. *Notes*: Price of capital equals other operating expenses as a percent of total fixed assets.

interest revenue is about 0.3 implying a moderate positive relationship. Labour and capital prices are each negatively related to interest income, and this association is statistically significant.

Table 3: Correlation matrix

	Interest income	Deposit price	Labour price	Capital price	EQTY	LTA	LLP	OI
Interest income	1.00							
	(0.00)							
Deposit price	0.30	1.00						
	(0.00)							
Labour price	-0.47	-0.70	1.00					
	(0.00)	(0.00)						
Capital price	-0.31	0.16	0.04	1.00				
	(0.00)	(0.01)	(0.52)					
EQTY	-0.06	-0.42	0.24	-0.24	1.00			
	(0.33)	(0.00)	(0.00)	(0.00)				
LTA	0.28	-0.30	0.17	0.13	0.39	1.00		
	(0.00)	(0.00)	(0.01)	(0.04)	(0.00)			
LLP	0.02	-0.02	0.05	0.40	-0.25	0.12	1.00	
	(0.76)	(0.72)	(0.42)	(0.00)	(0.00)	(0.05)		
OI	0.90	0.22	-0.32	-0.17	-0.16	0.39	0.13	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.04)	

Source: Own calculations based on data from Central Bank of Lesotho. *Notes*: EQTY is a bank-specific factor measured as the ratio of equity to total assets, LTA is a bank-specific factor measured as the ratio of loans to total assets. LLP is Loan-loss provision, and OI is other income in maloti. $p-$values in parentheses.

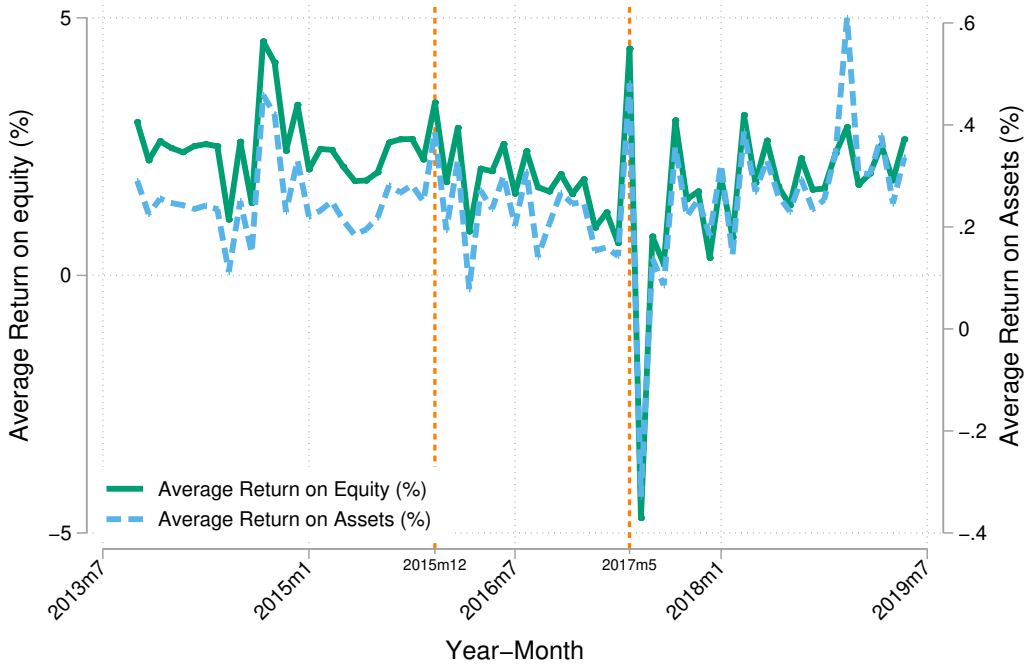
6 Results

In this section we present our empirical findings on the degree of banking competition in Lesotho. We first present the descriptive analysis of industry profitability and pricing behaviour, which provides some preview of market conduct. We then present our results on degree of competition from the Panzar-Rosse and Boone indicator models.

6.1 Preliminary results

We first look at the industry's performance over time. Figure 6.1 shows the banking industry's profitability as measured by return on assets (ROA) and return on equity (ROE) from the year 2013 to 2019. ROA measures the ability of banks to generate profit out of their assets, while the ROE reveals banks' effective use of their investors' funds. Overall, figure 6.1 shows that the banking industry has remained profitable, and maintained good quality assets for the past seven years. The ROA averaged about 0.25 percent while ROE averaged about 2 percent from October 2013 to May 2019.

Figure 6.1: Commercial Banks' Profitability: 2013–2019



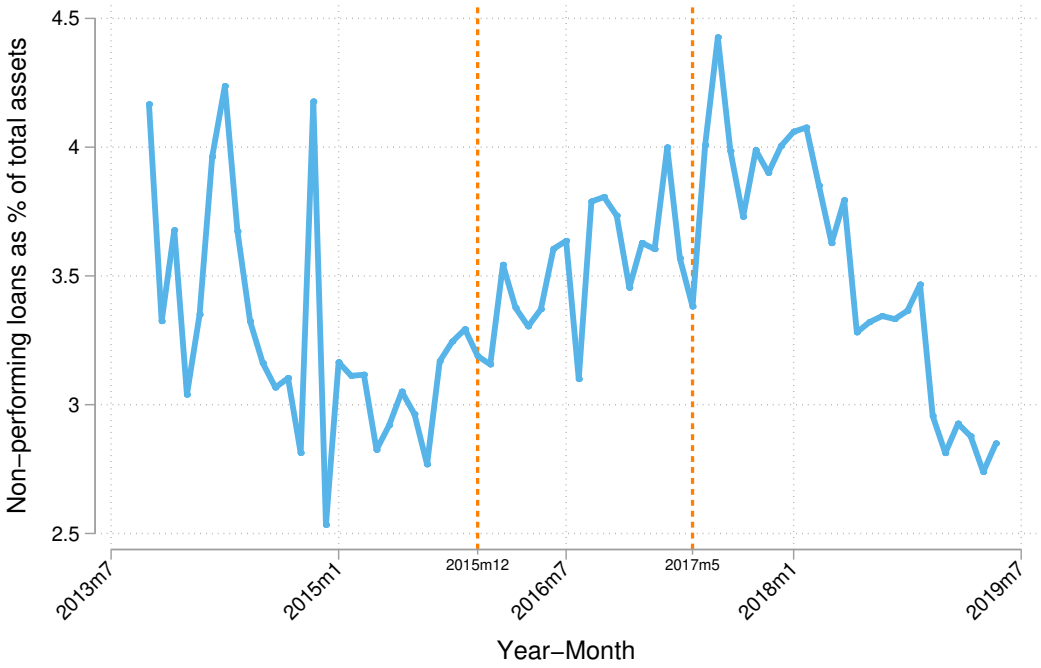
Source: Own calculations based on data from Central Bank of Lesotho. *Notes*: Return on equity is given as $ROE = \frac{\text{Net Income}}{\text{Equity}}$ and Return on assets is given as $ROA = \frac{\text{Net Income}}{\text{Total Assets}}$. These returns have been averaged across the banks in each month of the year.

Given the South African banks' domination of Lesotho's banking industry, and the fact that South Africa is a dominant economy within the CMA, the movements in Lesotho's banking industry performance are also driven by developments in the South African economy. In figure 6.1, the vertical (orange) dash lines mark two periods of big political events; (1) the firing of the former South African Minister of Finance, Mr. Nhlanhla Nene in December 2015, and (2) the June 2017 snap election in Lesotho. In both of these periods, the industry's performance dropped.

Figure 6.2 shows the changes in non-performing loans (as a percent of total loans) of the banking sector between 2013 and 2019.[7] The lower the percent of non-performing loans to total loans in the banking sector,the lower the risk of default, and this signals the higher quality of assets held by the banks. Although the ratio of non performing loans to total loans increased between 2015 and 2017 - a period of heightened political tensions - it largely remained below the tolerance level of 4 percent throughout the period. Similar to the changes in the industry's profitability shown in figure 6.1, the ratio of non-performing loans to total loans increased following political events in South Africa and Lesotho in 2015 and 2017, respectively. By and large, the figure shows that the baking sector is holding good quality assets due to the low risk of default, and would suggest that they charge low lending interest rates since they lend to low risk borrowers. But this appears not

[7] According to the Central Bank of Lesotho's Financial Institutions Regulations of 2016, a loan is non-performing if the borrower fails to meet scheduled loan repayments for at least 90 consecutive days.

Figure 6.2: Non-Performing Loans to Total Loans and Advances: 2013–2019



Source: Own calculations based on data from Central Bank of Lesotho.

to be the case.

Figure 6.3 shows the lending and deposit spread between 2000 and 2016. Despite the relatively low ratio of non-performing loans, the spread between lending and deposit rates has increased sharply between 2013 and 2018 (see Figure 6.3(a)). In fact, as shown in Figure 6.3(b), the spread between the maximum lending rate and the maximum deposit rate is about 24 percentage points as of May 2019, and it reached as high as 32 percentage points in March 2017. This huge spread clearly shows that banks charge customers much higher lending rates on loans than they reward their deposits, and may explain a large part of the industry's profitability seen in figure 6.1. This is at odds with evidence from figure 6.2, and is indicative of an uncompetitive industry.

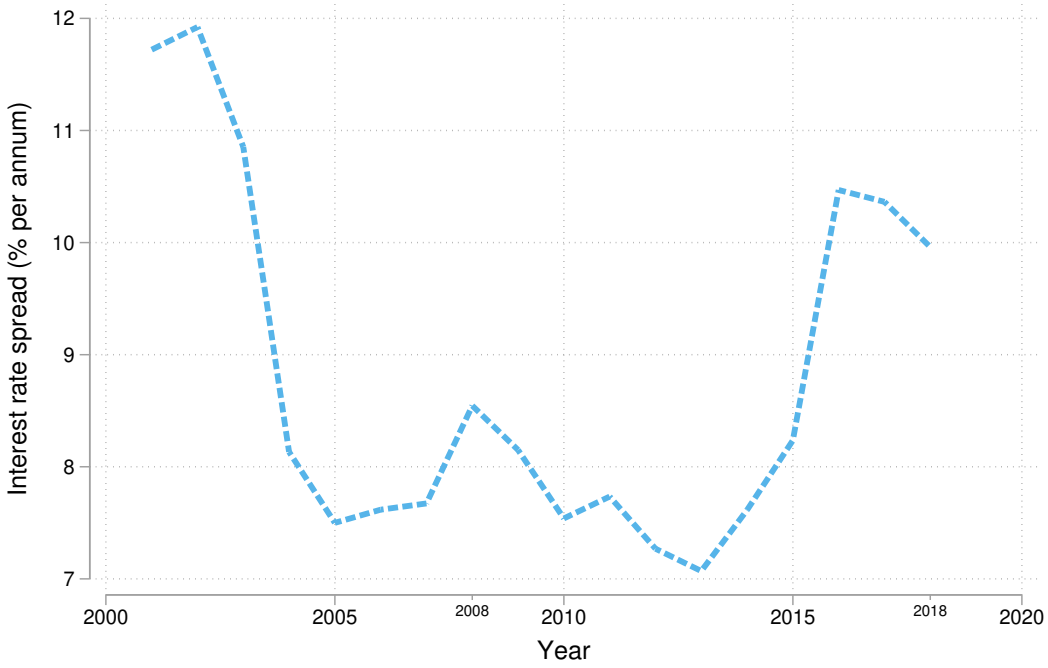
According to Mlambo et al. (2012) "[o]ligopolistic structures, combined with inadequate regulation and supervision of financial markets, *allow* interest rate spreads tend to widen and *limit* efficiency gains." (p.34, own emphasis). This implies that oligopolistic or highly concentrated markets lead to inefficient pricing. Given this, we now look at how the banking market concentration has evolved during the study period.

Figure 6.4 shows the trends in the Herfindahl–Hirschman Index (HHI) for total banks assets, deposits, and loans between 2013 to 2019.[8] If $1000 < \text{HHI} \leq 1800$, the market is moderately

[8] $\text{HHI} = \sum_{i=1}^{N} s_i^2$, where N is the number of banks in the market and s is the market share of the ith bank (Tirole, 1988). When all firms have an equal market share, HHI reaches is lowest value of, for example, 2500 for a market with 4 firms.

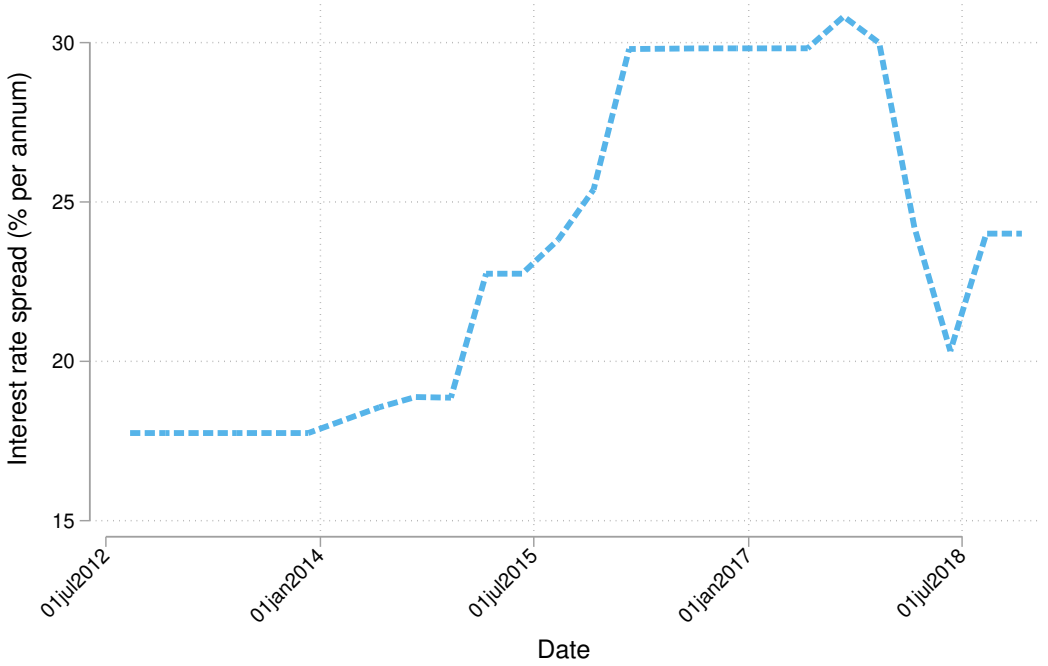
Figure 6.3: Interest Rate Spread

(a)



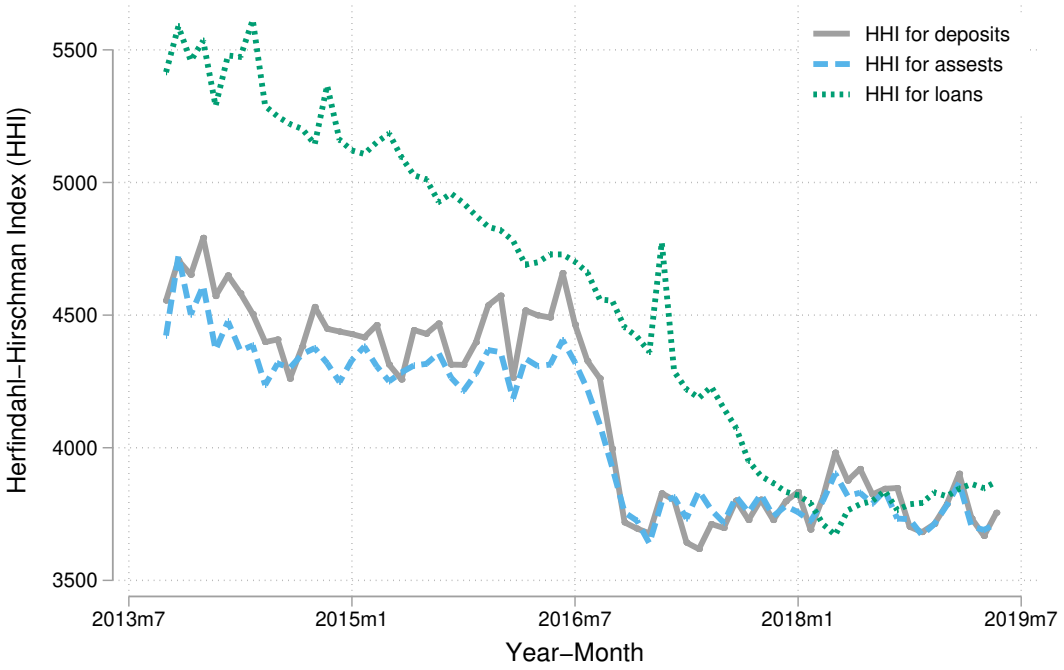
Source: Own representation based on data from World Development Indicators. *Notes*: Interest rate spread is the interest rate charged by banks on loans to private sector customers minus the interest rate paid on deposit.

(b)



Source: Own representation based on data from World Development Indicators. *Notes*: Interest rate spread equals the the maximum lending rate minus the the maximum savings rate.

Figure 6.4: Evolution of banking sector concentration: 2013–2019



Source: Own calculations based on data from Central Bank of Lesotho.

concentrated, and if HHI $>$ 1800 the market is considered highly concentrated (Karasulu et al., 2007). We can see from figure 6.4 that the HHIs for assets, deposits and loans have all been declining over time, from the high of about 4800 points (HHIs for assets and deposits) or 5500 points (HHI for loans) in 2013 to steady at around 3800 points in 2019. This shows that Lesotho's banking industry is highly concentrated, and this level of concentration is higher than the African average (Fosu, 2013). However, the high concentration level does not necessarily imply that the industry is uncompetitive.

In all, the analysis thus far indicates that, while the entry of new banks has brought some competition (as indicated by the increase in the small banks' market share), the industry charges high lending rates despite being faced with relatively low risks of default, and this potentially explains the high profitability of the bank. We have also seen that the industry is highly concentrated. Even though the high concentration level does not necessarily imply that the industry is uncompetitive, taken together, the analysis in this section provides a prima facie evidence that the industry is potentially uncompetitive. Hence, the next section provides a more detailed analysis of competition using the Panzar-Rosse model and the Boone indicator method.

6.2 Regression Results

6.2.1 The Panzar-Rosse model results

This subsection presents the Panzar-Rosse H-statistic results from the estimation of the unscaled revenue function given in equation 4.5. Since the Panzar-Rosse model relies on the assumption that the market is in a long-run equilibrium, we perform the return on assets (ROA) test by estimating equation 4.6 using the fixed effects (within) regression method with **?** standard errors.[9] Since we expect changes in market concentration to have an influence on the return on assets, we also control for it in column (2) of table 4.6. We can see from table 4.6 that the ROA H-statistic, $H_{ROA} = -0.26$ and is statistically different from zero. This implies that the banking industry is not in a long-run equilibrium and exhibits characteristics consistent with monopoly, oligopoly, or short-run equilibrium (Bikker et al., 2012). Given this result, therefore, we expect the $H-$statistic to also be less than zero.

Table 5 reports the fixed effects (within) regression results of Panzar-Rosse model.[10] Columns (1) and (2) of the table report results for the case where interest income is the dependent variable, while column (3) and (4) report those for when total income is the dependent variable due to the increasing share of non-interest income in the composition of banks total revenue. Similar to the results presented in table 4.6, we have also controlled for the the concentration index (HHI) in columns (2) and (4). Looking at the results from column (1), we can see that the coefficient for the deposit price is positive (0.2678) and statistically significant at all conventional levels of significance. This means that a percentage increase in deposits price will, on average, increase interest revenue by about 0.27 percent, all else constant. This result is in line with many empirical studies in banking sector competition (Simatele, 2015; Mirza et al., 2016). The coefficient for the labour price is negative (-0.5388) and statistically significant at all levels, and implies that a one percent increase in labour costs reduces interest revenue by about 0.54 percent, all else constant. Bikker and Haaf (2002), Simbanegavi et al. (2014) and Simatele (2015), however, find a positive coefficient of labour price. Lastly, the capital price is negative (-0.0214) but statistically insignificant at all conventional levels of significance.

Contrary to theory and previous literature (see, for example, Simbanegavi et al., 2014), the ratio of equity to total assets ($EQTY$) is positive and statistically significant, implying that higher leverage increases interest income. The results also show that, consistent with theory, loans to total assets (LTA) coefficient is positive and statistically significant at all levels of significance. The loan-loss provision (LLP) appears with a positive sign and is statistically significant, contrary to our expectation that increases in non-performing loans should reduce interest revenue. This result implies that less risk averse banks generate more interest revenue than more risk averse

[9] The results from the pooled OLS and pooled FGLS (not reported) are qualitatively similar.

[10] Table A.1 presents qualitatively similar pooled OLS and FGLS results. H statistic from pooled OLS is about -1.1 and the FGLS H statistic equals -0.25, almost equal to that from the within estimator.

Table 4: Long-run equilibrium test results

VARIABLES	(1)	(2)
	$\ln(1+ROA)$	$\ln(1+ROA)$
ln(Deposit Price)	-0.0090	-0.0021
	(0.0226)	(0.0228)
ln(Labour Price)	-0.2197***	-0.2325***
	(0.0468)	(0.0501)
ln(Capital Price)	-0.0313	-0.0319
	(0.0220)	(0.0207)
ln(EQTY)	0.0675	0.1016
	(0.0666)	(0.0751)
ln(LTA)	0.0883*	0.0990**
	(0.0519)	(0.0478)
ln(LLP)	-0.0764***	-0.0439*
	(0.0259)	(0.0262)
ln(Other Income)	0.1180***	0.1203***
	(0.0317)	(0.0359)
$\ln(HHI)$		0.3188***
		(0.1037)
Constant	-2.3941***	-4.8863***
	(0.4027)	(0.9193)
Observations	271	271
Number of Banks	4	4
H	-0.2599	-0.2666
$H_0 : H = 0$ $(p - value)$	0.0002	0.0003

Notes: Driscoll-Kraay standard errors in parentheses. H is the Panzar-Rosse H-statistic. EQTY is a bank-specific factor measured as the ratio of equity to total assets, LTA is a bank-specific factor measured as the ratio of loans to total assets, LLP is Loan-loss provision, and OI is other income in maloti. *significance at 10%; **significance at 5%; ***significance at 1%.

banks that potentially grant loans only to customers with exceptional credit history at low interest rates. Lastly, the results indicate that the ratio of other income to total assets appears with a negative sign, although it is statistically insignificant.

The $H-$statistic, which is the sum of coefficients of input prices ranges between -0.29 and -0.16, and is statistically significant at 5 percent level (in columns (1) and (2)) and at 10 percent level (in columns (3) and (4)). Looking at $H = -0.29$ in column (1), for example, it means that a one percent increase in input prices reduces interest income by about 0.29 percent, holding all other factors constant. This result indicates the case of a perfectly colluding oligopoly market structure (Bikker et al., 2012). Therefore, banks in Lesotho have high degree of market power, allowing them to set uncompetitively high prices.

As a robustness check, we estimate the $H-$statistic controlling for implicit scale correction.

Table 5: Estimation results: Panzar-Rosse approach

VARIABLES	(1)	(2)	(3)	(4)
	Interest Income	Interest Income	Total Income	Total Income
ln(Deposit Price)	0.2678***	0.2298**	0.2310***	0.2047***
	(0.0955)	(0.0893)	(0.0761)	(0.0697)
ln(Labour Price)	-0.5388***	-0.4730***	-0.4009***	-0.3552***
	(0.0806)	(0.0628)	(0.0658)	(0.0521)
ln(Capital Price)	-0.0214	-0.0202	-0.0116	-0.0108
	(0.0455)	(0.0345)	(0.0334)	(0.0272)
ln(EQTY)	0.4838***	0.2785***	0.4070***	0.2646***
	(0.1134)	(0.0821)	(0.0919)	(0.0651)
ln(LTA)	0.4549***	0.3897***	0.2968***	0.2516***
	(0.1438)	(0.1146)	(0.0955)	(0.0749)
ln(LLP)	0.3345***	0.1374*	0.2403***	0.1035**
	(0.0855)	(0.0747)	(0.0557)	(0.0489)
ln(Other Income)	0.1530	0.1377*	0.2742**	0.2635**
	(0.1190)	(0.0798)	(0.1342)	(0.1076)
ln(HHI)		-1.9154***		-1.3289***
		(0.2751)		(0.1879)
Constant	9.6467***	24.5662***	8.8953***	19.2470***
	(1.4600)	(1.9582)	(1.4765)	(1.9263)
Observations	272	272	272	272
Number of Banks	4	4	4	4
H	-0.2924	-0.2634	-0.1815	-0.1613
$H_0 : H = 0$ $(p - value)$	0.0272	0.0265	0.0541	0.0541
$H_0 : H = 1$ $(p - value)$	0.0000	0.0000	0.0000	0.0000
Hausman test for FE (F_{stat})	72.22			

Notes: Driscoll-Kraay standard errors in parentheses. H is the Panzar-Rosse H-statistic. EQTY is a bank-specific factor measured as the ratio of equity to total assets, LTA is a bank-specific factor measured as the ratio of loans to total assets, LLP is Loan-loss provision, and OI is other income in maloti. *significance at 10%; **significance at 5%; ***significance at 1%.

For the H statistic to be reliable, we have to verify that the explanatory variables have low correlation with total assets to avoid implicit scale corrections (Bikker et al., 2012). The absolute correlation between the explanatory variables and total assets ranges from 0.12 to 0.72. The variables with high correlation with the log of total assets (i.e. ln(Total Assets)) are ln(Deposit Price), ln(Labour Price) and ln(Other Income) with absolute correlation values 0.71, 0.72 and 0.80, respectively. All other variables have correlation values below 0.20, which according to Bikker et al. (2012) is low. Following Bikker et al. (2012), we estimate the unscaled revenue equation by including in the regression only parts of ln(Deposit Price), ln(Labour Price) and ln(Other Income) that are orthogonal to ln(Total Assets). The results are reported in appendix table A.2. These results are generally consistent with the main results.

6.2.2 The Boone Indicator results

While the Panzar-Rosse model results are largely consistent with our descriptive analysis, it has been shown that the $H-$statistic can take either sign for any degree of competition (Bikker et al., 2012; Shaffer and Spierdijk, 2015). This subsection, therefore, presents the degree of competition results from the more robust Boone indicator following (Van Leuvensteijn et al., 2011; Mirza et al., 2016). The main results are presented in table 6. We can see that the Boone indicator β (i.e. the coefficient of ln(Average Costs)), from our preferred within estimates equals -0.20, and is statistically significant at 10 percent level.

We know that the lower the Boone indicator is, in absolute values, the lower the level of competition. However, since there is no benchmark as to how low β should be to conclusively say that the market is uncompetitive, we draw comparison with results from Van Leuvensteijn et al. (2011) to aid our conclusion. Van Leuvensteijn et al. (2011) find that Germany and Spain have the most competitive markets in the Euro area, with Boone indicators less than -2.6, while France and the UK have the most uncompetitive loan markets, with Boone indicators between -1.56 and 0.27. Based on this, and noting that the Boone indicator is ordinal, it is clear that Lesotho's banking industry is more uncompetitive than any of the markets considered in Van Leuvensteijn et al. (2011).

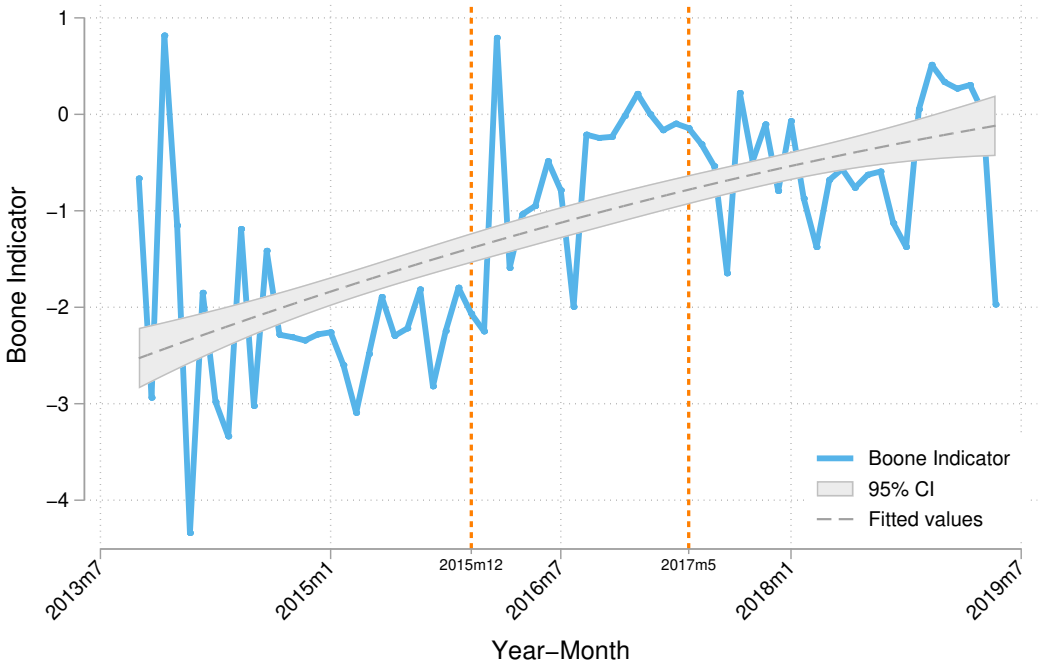
Table 6: Estimation results: Boone Indicator

VARIABLES	(1) Pooled FGLS (Prais-Winsten)	(2) Fixed Effects (Within)
ln(Average Costs)	-0.0383*	-0.2046*
	(0.0201)	(0.1038)
Constant	2.6448***	1.7957***
	(0.1027)	(0.5257)
Observations	272	272
R-squared	0.927	0.0435
Number of Banks	4	4

Notes: Column (1) reporsts Pooled FGLS (Prais-Winsten) estimates using xtpcse stata command , while column (2) reports fixed effects estimates with Dristoll and Kraay standard errors using xtscc stata command. All standard errors (in parentheses) are robust to heteroskedaticity, contemporaneous correlation across panels, and within panels autocorrelation. Within R^2 reported in column (2). *significance at 10%; **significance at 5%; ***significance at 1%.

Next we look at how banking competition has evolved over time by estimating the Boone in-

Figure 6.5: Changes of the Boone Indicator over time: 2013–2019



Source: Own calculations based on data from Central Bank of Lesotho.

dicator at point in time.[11] Figure 6.5 the trend in banking competition in Lesotho. We can see that there is a strong upward trend toward zero, indicating a continuous decline in competition. In fact, competition seem to dropped rapidly between December 2015 and May 2017 (both marked by the (orange) dash vertical lines). This is the period during which there were major political developments in South Africa (the firing of the finance minister) and in Lesotho (heightened political tensions until elections).

7 Discussion of Results

In all, the results suggest that the banks in Lesotho operate in the market that is typical of a monopoly or a perfectly colluding oligopoly. This is no doubt bad news for consumers of banking services in Lesotho and the Central Bank of Lesotho as the regulator of the banking institutions.[12] Lack of competition raises concerns regarding the quality and efficiency in the provision of banking services in Lesotho, and therefore, calls for policy intervention to ameliorate the situation.

Comparing the results of this study and other studies, we find that on the overall, the banking

[11]Note, however, that, since there are only 4 banks in the market, the Boone indicator is estimated from a regression with only 2 degrees of freedom. Therefore, this are not robust and are only indicative of the direction of competition in Lesotho's banking sector.

[12]Lesotho has no competition authority like other countries such as Botswana and South Africa, hence the Central Bank of Lesotho is a de facto overseer of market conduct.

industries in most countries exhibit monopolistic competition. For example, Simbanegavi et al. (2014) and Simatele (2015) in South African, and Mirza et al. (2016) in Pakistan, find monopolistic banking competitions in in their respective markets.

Lesotho's banking industry has unique features that might explain the difference between the results of this paper and those from other countries. Despite the dominance of South African banks in Lesotho, the financial system is still less developed compared to that of South Africa. Hence, banks invest their funds in South Africa to take advantage of higher rates. Moreover, due to the proximity of Lesotho to South Africa, many Basotho have accounts with South African banks, perhaps in search of higher returns in South Africa. One would expect that the Lesotho's banking industry to be more competitive to discourage Basotho from having bank accounts with South African banks. However, since majority of banks in Lesotho are subsidiaries of South African banks, and they invest part of their deposit takings from Lesotho in South Africa, they have little or no incentive to compete with their mother companies. Second, the adage that "when the cat's away, the mice will play" may help us explain the behaviour of Lesotho's banking industry. It is likely that, as the results clearly indicate, banks in Lesotho are colluding given that their parent companies in South Africa (where is a competition commission) have been caught in collusion practices in that market.

8 Conclusion and Recommendations

The study examines the level of competition in the Lesotho's banking industry using bank level data spanning from 2013 to 2019, for the entire banking industry.

To ascertain the degree of competition amongst the commercial banks, we use the Panzar-Rosse method and the Boone indicator model. The results suggest that banks in Lesotho operate under a perfectly colluding oligopoly market, with the H-statistic ranging from -0.29 and -0.16, and a Boone indicator of -0.20. These results suggest that Lesotho commercial banks collude in setting their output and prices. It is imperative, therefore, for authorities to implement policies aimed at increasing competition in the banking sector. For example, authorities can actively look to encourage more players into the industry, and set up the long anticipated competition authority to oversee conduct in all other industries, including banking. This is because low competition in the banking industry adversely affects consumers and hinders economic growth.

This study is, however, not without limitations. The main limitation is the shorter sample size due too many gaps in the data for years prior to 2013. Nevertheless, the results still provide important insights about the level of competition in Lesotho's banking industry. The second limitation is that our analysis of trends in competition relies on just 'indicative results' that are not robust due to the fact there are few banks in the industry. Since competition in banking changes over time, future studies could consider using other methods such as the conjectural variations method, which requires a different data set, to analyse these dynamics. Another prospect for future research is to

extend the study to analyse banking competition in the CMA area, where there is dominance of South African banks, perhaps to see whether there is a pattern in banks' (subsidiaries) behaviour to either confirm or disprove some our speculations about banking competition in Lesotho.

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Appendix A

Table A.1: Estimation results: Panzar-Rosse approach

VARIABLES	(1)	(2)	(3)	(4)
	Pooled OLS	Pooled OLS	Pooled FGLS	Pooled FGLS
ln(Deposit Price)	0.1552	0.1254	0.3870***	0.4102***
	(0.0994)	(0.1059)	(0.0494)	(0.0409)
ln(Labour Price)	-0.9196***	-0.8793***	-0.6205***	-0.5330***
	(0.1145)	(0.1125)	(0.0629)	(0.0544)
ln(Capital Price)	-0.2945***	-0.3029***	-0.0118	-0.0627
	(0.0770)	(0.0813)	(0.0468)	(0.0403)
ln(EQTY)	0.4745***	0.3045**	0.3551***	0.2483***
	(0.1194)	(0.1423)	(0.1107)	(0.0894)
ln(LTA)	0.5132**	0.4712**	0.3288***	0.1483*
	(0.2100)	(0.1966)	(0.1060)	(0.0872)
ln(LLP)	0.2238**	0.0727	0.1434*	0.0210
	(0.0863)	(0.0848)	(0.0747)	(0.0614)
ln(Other Income)	0.5603***	0.5743***	0.2538***	0.2566***
	(0.1347)	(0.1297)	(0.0424)	(0.0357)
ln(HHI)		-1.4172***		-2.1833***
		(0.3167)		(0.2874)
Constant	1.8678	12.5369***	7.5729***	25.3054***
	(1.7675)	(3.2658)	(0.8800)	(2.3703)
Observations	272	272	272	272
R-squared	0.862	0.872	0.991	0.995
Number of Banks	4	4	4	4
H	-1.0589	-1.0568	-0.2453	-0.1854
$H_0 : H = 0$ $(p - value)$	0.0000	0.0000	0.0208	0.0377
$H_0 : H = 1$ $(p - value)$	0.0000	0.0000	0.0000	0.0000

Notes: Panel-corrected standard errors. H is the Panzar-Rosse H-statistic. EQTY is a bank-specific factor measured as the ratio of equity to total assets, LTA is a bank-specific factor measured as the ratio of loans to total assets, LLP is Loan-loss provision, and OI is other income in maloti. ln(Deposit Price), ln(Labour Price) and ln(Other Income) were replaced by their respective parts that are individually orthogonal to ln(Total Assets). *significance at 10%; **significance at 5%; ***significance at 1%.

Table A.2: Estimation results: Panzar-Rosse approach

VARIABLES	(1)	(2)	(3)	(4)
	Interest Income	Interest Income	Total Income	Total Income
ln(Deposit Price)	-0.2265***	-0.2289***	-0.0991***	-0.0995***
	(0.0238)	(0.0237)	(0.0206)	(0.0202)
ln(Labour Price)	-0.1349***	-0.1337***	-0.1444***	-0.1360***
	(0.0464)	(0.0465)	(0.0389)	(0.0380)
ln(Capital Price)	-0.0433	-0.0430	-0.0415	-0.0376
	(0.0329)	(0.0329)	(0.0287)	(0.0281)
ln(EQTY)	0.1729*	0.1923*	0.0187	0.0652
	(0.0950)	(0.0999)	(0.0802)	(0.0829)
ln(LTA)	0.2852***	0.2899***	0.2942***	0.2922***
	(0.0811)	(0.0806)	(0.0731)	(0.0716)
ln(LLP)	0.1179**	0.1331**	0.1336***	0.1625***
	(0.0565)	(0.0615)	(0.0492)	(0.0526)
ln(Other Income)	0.0540*	0.0520*	0.1806***	0.1784***
	(0.0283)	(0.0283)	(0.0232)	(0.0227)
ln(HHI)		0.2223		0.5044**
		(0.2388)		(0.1990)
Constant	11.7624***	10.0288***	11.8130***	7.8547***
	(0.3422)	(1.8165)	(0.3008)	(1.5065)
Observations	272	272	272	272
R-squared	0.908	0.908	0.923	0.924
Number of Banks	4	4	4	4
H	-0.4047	-0.4056	-0.2850	-0.2730
$H_0 : H = 0$ $(p - value)$	0.0000	0.0000	0.0000	0.0000
$H_0 : H = 1$ $(p - value)$	0.0000	0.0000	0.0000	0.0000

Notes: Panel-corrected standard errors. H is the Panzar-Rosse H-statistic. EQTY is a bank-specific factor measured as the ratio of equity to total assets, LTA is a bank-specific factor measured as the ratio of loans to total assets, LLP is Loan-loss provision, and OI is other income in maloti. ln(Deposit Price), ln(Labour Price) and ln(Other Income) were replaced by their respective parts that are individually orthogonal to ln(Total Assets). *significance at 10%; **significance at 5%; ***significance at 1%.